MOTOR AGE

Vol. XXXIII
No. 18

CHICAGO, MAY 2, 1918

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It attracts steady customers—therein lies its great value.

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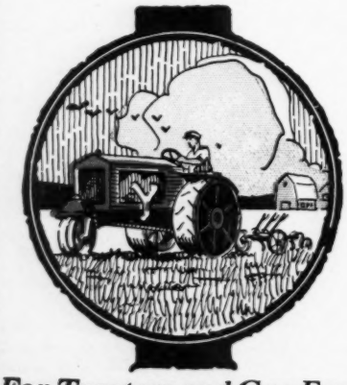

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MOTOR AGE

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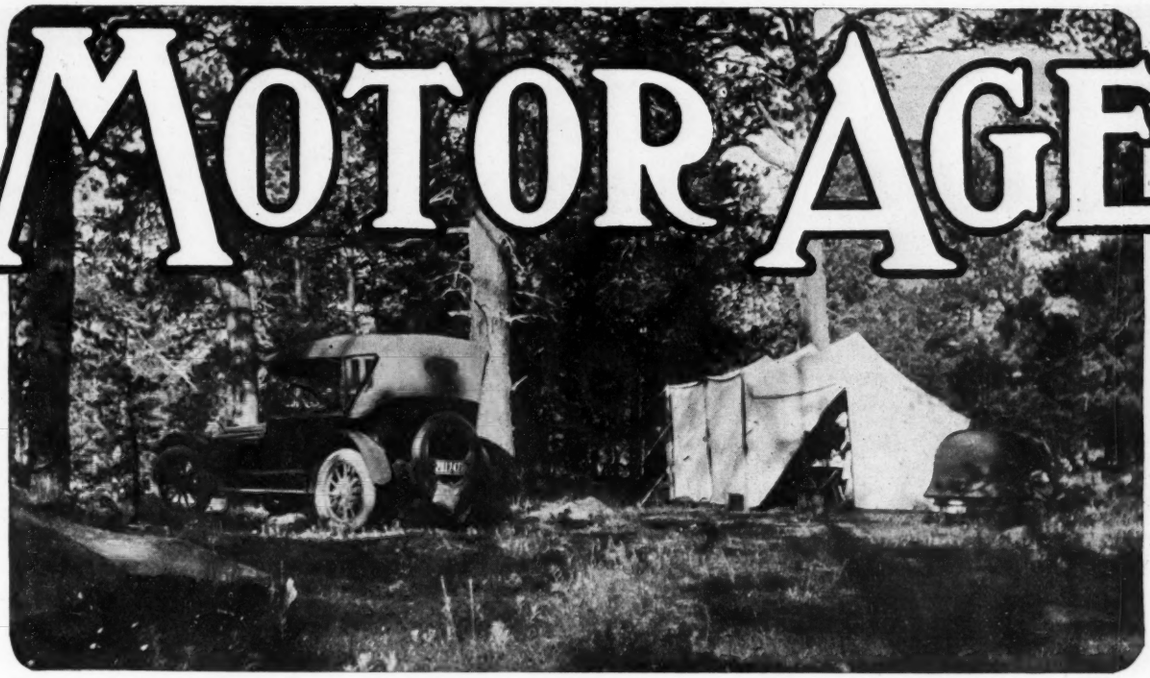


At home in Rocky Mountain National Park, with shade overhead, a kaleidoscope of different views of the snow caps, free fuel underfoot and good water and trout within a few rods

Camping to Colorado

By Avis Gordon Vestal

WHEN two persons, with no other experience with a car than 700 miles of motoring before starting out, can make a tour of 4044 miles at a total direct cost of $186, and so successfully that even while returning home they plan to repeat it the next vacation time, the hows of the trip are worth passing on to other motorists. For what has been done by these can be done by others, provided the parties of the first part, the two persons, give the parties of the second part, motorists in general, the benefit of their experience. Mrs. Vestal itemizes the direct cost of the trip and also gives the indirect costs, such as overhauling the car after the return, equipment that is permanent, etc. The trip lasted seventy-two days and was to Colorado from Illinois and back.—Editor.

BEFORE starting on this happiest venture of our lives, my husband and I were eager to learn from other long-distance tourists how to conduct our preparedness campaign, what joys were in prospect, what probable difficulties must be met with a grin and an exercise of ingenuity. So we were regular question boxes, and we reaped much assistance second hand from the garnered stores of experience of those who had camped before us. The pleasures of a long jaunt in the camouflage of gypsies are not all confined to the days of motoring. They have their introduction in the winter or springtime before the vacation, when the family spreads out maps and histories and catalogs of equipment and plans routes and the selection of the outfit. Better yet, after returning quite safely, vacation joys can be relived under the reading lamp with a portfolio of pictures, one member of the group reading aloud the diary of the trip and the others interrupting with don't-you-remembers.

Making Your Own Test

If you are curious to know whether a motor camping trip offers more satisfaction in anticipation than in realization, solve the problem by the laboratory method of experimentation. Make your own car a portable testing outfit. I will admit frankly that the joke was on us in the matter of anticipation. We did look forward to much pleasure with our car and camp—after we should reach the mountains. It was largely to use them in Colorado that we purchased them. Living in a flat land, we are ardent lovers of the big hills, and they completely filled our mind's eye. We could go by train from Chicago to Denver in 30 hr., which would leave us so much more time in Colorado. To spend a week or ten days, each way, in the slower motor travel, in the heat and dust, and cross hundreds of miles of plains looked like a relative hardship to get the car out there. We were properly fooled. Each day of the journey proved in actuality to bring its own scenic beauties, to bring us in contact with interesting people and to have always the charm of adventure. One never knew from one minute to the next what would appear around a turn of the road. If the haps were stimulating, even the mishaps had their merits in developing some measure of the pioneer spirit to overcome them, and they certainly add spice to the retrospect. As to the heat, the rapid motion of the car made its own breeze, and much of the trip was in the dry lands where the temperature is less oppressive than in our humid central states. Only Eastern Colorado, on the Santa Fe from the line westward to Pueblo, about a day's run, was uncomfortably hot. As for dust, again we guessed wrong. With about three exceptions we found relatively little dust and we ran away from that.

Working up the diary of the gypsying trip to Colorado on the road

Compared with Train

Our 1916 vacation had been by train to the same mountain Mecca, so we were in a position to compare it with the motor trip in 1917. The second trip had the first beaten to a frazzle. Not counting the cost of the car and accessories, the camp outfit and wear and tear upon the tires, the direct cost of the two vacations was approximately the same, though the cost of the first trip would have far exceeded the second one had we been hotel guests. As it was, the cost of the first summer, 1916, had been held down by renting tents and log cabins and doing our own light house-

As many states as tents are represented here in Rocky Mountain National Park. A mountain stream flows in the valley behind the portable homes

keeping in them. Money, however, is not the only standard for measuring worth, for we lived more fully and learned more and were more stimulated and refreshed by the motor trip than by the train journey. We had slept through much of the train trip and in our waking hours the sights flashed by too swiftly to be assimilated. Furthermore, the trains often avoid the things one would care most to see.

4044 Miles

You are invited herewith to follow me and imagine yourself a member of the party, but if you are too busy to accept, here are some crumbs of conclusions which you may have as a hand out. The entire distance traveled, Chicago to Rocky Mountain Park and return, including side trips and daily excursions, was 4044 miles. The route was not a direct one but was chosen to include half a dozen places we wished definitely to visit. It is possible for one who must hasten to go from the Windy City to this same beautiful Government land by a direct route in a week. We preferred a more leisurely travel after discovering how many interesting impressions there were to every day. Our total time was seventy-two days, which was the length of the school vacation. For twenty-five of these days we were the guests of friends and relatives. For the remaining forty-seven days we grub-staked ourselves, this time representing the journey and a halt of several weeks in the mountains. We used 272 gal. of gasoline at a cost of $61.95. The price increased regularly from East to West, the range being from 19 to 26 and 28 cents by the time the foothill cities of Colorado were reached. In the village of Estes Park, some miles from a railroad, we paid 32 cents a gallon. The average was 23.9 cents per gallon. Our average mileage was not high, owing partly to the fact that we had had only about 700 miles of preliminary experience with our new car before starting and partly to a poor carbureter adjustment on the first half of the trip. We made 14.9 m.p.g. of gasoline. Our total direct cost was $186 for two persons, and $200 would have covered it had we provided our meals for the full time.

I kept always an open notebook upon my lap. Just now I can only dip into it here and there, but I shall try to include the practical points. No reduced pictures in black and white on the printed page can do justice to the coloring of the landscapes as we saw them. Even inserting a sachet bag between the leaves of the magazine cannot convey the choice collection of odors we made along the roadside. One point in which the motor trip is long is in training observation through the avenues of the senses. The eyes alone do not gather in the whole story. To the pleased nostrils come the fragrance of the wild roses and elderberries by the fence; passing a pasture near milking time there is a not unpleasant odor of the bossies, and in Kansas and Nebraska the blossoming alfalfa is a real treat. Ears that are attuned to nature gather in the pleasures of the bird songs, the wild animals, the tumbling brooks. The first sound of a mocking bird in a dwarf locust tree is a worthy rival to a concert in a city auditorium.

One piece of equipment most needful to make a long motor trip interesting every minute and memorable always thereafter is not purchasable in any accessory shop. It is your point of view, the attitude of your mind. You may call it riding a hobby. Your hobbies and ours may not be

Expenses Compiled for Car

COST OF TRIP

Gasoline, 272 gal	$ 61.95
Miscellaneous	52.30
Food for two	31.74
Ice	2.23
Kodak expense	14.43
Fishing	3.55
Postage and magazines	3.85
Personal	14.00
Small items	2.49
	$186.54

Miscellaneous included all operating expenses of the car other than gasoline, such as oil, repairing a blowout, $5.50; half a dozen punctures at from 25 cents to $1; a new pair of chains; replacing broken horn bracket; garage storage when visiting; bridge and ferry tolls, at from 15 cents to $1; distilled water; cleaning out carbon; carbureter adjustments; replacing broken tire pump; patching damaged upholstery, etc.

Food was purchased for forty-seven days in all and was for two persons.

Personal items included laundry, barber bills, a little amusement, small items of toilet and dress.

PERMANENT EQUIPMENT

Tent	$ 32.00
Tent cot bed	11.75
Sheet-iron stove	3.50
Folding table	2.85
Two folding stools	1.00
Water bucket	.80
Water bag	1.25
Spade	1.10
Camp ax	1.25
Refrigerator	3.95
Extra tent stakes	.40
Refrigerator clamps	.80
Rope for baggage	.30
Tableware	.65
Breadbox	.85
	$ 62.70

CLOTHING ADDITIONS

Overalls	$ 3.00
Veil	1.00
Duster	1.75
Outing skirt	3.95
Outing hat	1.45
Middy blouse	1.35

CAR AND ACCESSORIES

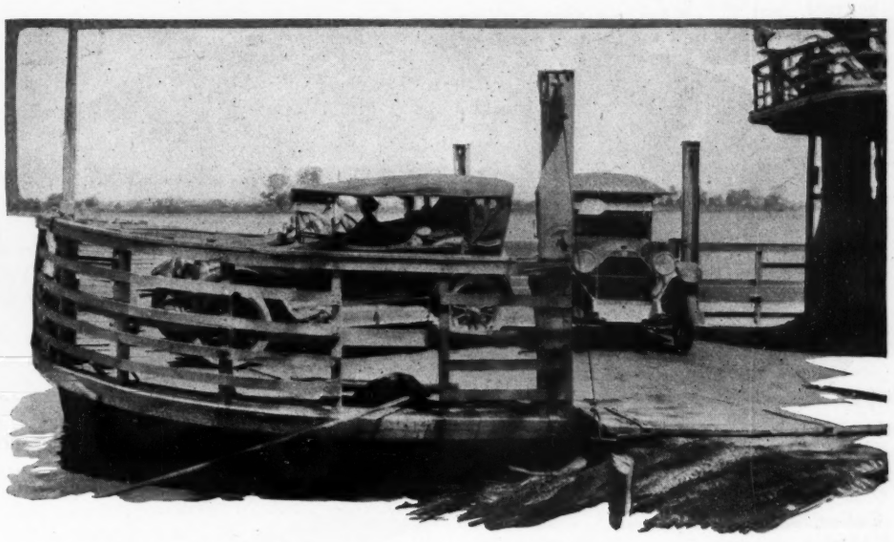
Car	$1,040.00
Car lock	6.50
Shock absorbers	22.50
Blue book, old	1.50
Pocket maps	.50
Tire cover	1.75
Spare tire	9.00
New inner tube	5.00
Extra lamps	2.15
Tire gage	1.00
Battery hydrometer	.80
Funnel	.50
Heel rest	.25

the same; they need not be; but have some and ride them. Here are some of the things you can notice as you ride along, keeping ever on the alert for facts along these lines: The kind and condition of the roads, the marking of the trail, the architecture of the houses, the kind and condition of crops, the hitherto unknown birds and animals and flowers and trees, the geology of the country, its history, the business of the towns, the number and makes of the cars you meet, the rural schoolhouses, etc. Several little handbooks of identification of birds, flowers, etc., are worth their cost and space. If you have children such a trip can be as educative as a year in the classroom.

Our first two days were largely days of adjustment while crossing Illinois from Chicago to Hamilton. Hamilton is on the beautiful bluff of the Mississippi at the eastern terminus of the big water power dam which distributes power as far as St. Louis and which backs the river up to form a widening named Lake Cooper for the engineer who built it. This lake extends northward 40 miles to Burlington, Iowa. Our route was not direct but was made to include Starved Rock on the Illinois river because of its scenic attraction. Save for the several large and small river valleys the route was mostly level, and hence less picturesque than the rolling hills of Iowa. The beauty I shall longest remember was that in Illinois were more rambler roses than I had thought bloomed in the world. It seemed that nearly every town and farm house had them in crimson or rosy glory. They were in their prime in late June. As to roads, we cannot brag about them, that is, of such of them as we rode over, though near LaHarpe were a few miles of splendid oiled roads, properly graded. We may have been prejudiced by the mud, however.

Followed by Rain

Friday, the 22d of June, was a sunny day, so we packed accordingly. When we started at 5:30 on the following morning a rain was starting. We took the chance that it might be purely local and we could outrun it, but it followed us along until noon. We were amateurs, having ridden only about 700 miles since purchasing our car, and this was our first long trip. We were both very tired these first two days, owing to difficulties with mud and to our inexperience in riding for entire days, but after this initiation we found all the days invigorating and refreshing. Our one set of tire chains, packed when the sun shone, were in the bottom of the load, inaccessible until we unpacked at night. Our packing looked sound when the car stood meekly in the garage, but we were not out of the city before the load began to rattle and small articles at the top of the tonneau load began to slide forward and fall upon our necks.



There was no bridge across the Missouri at Boonville, Mo., so a steam ferry was used

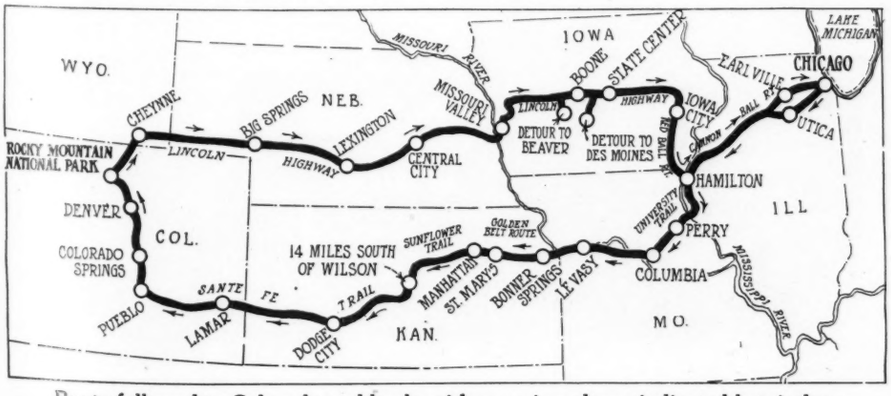
One road had been changed since our Blue Book was printed and we were following it, not knowing until later that there is a better road than that given in this guide, named and marked as the Starved Rock trail. Several times we lost our way. In Joliet the streets were not marked to permit following the Blue Book directions and the several persons we asked misdirected us, so after we had ridden several miles beyond that city, we had to return and start all over again. One of our greatest trials on the entire trip was in finding the proper road out of towns where neither trail markers nor street names were posted. In the afternoon a garage man directed us down a road paralleling the drainage canal. The mud was so deep we thought it had no bottom. When we struck the bottom we almost wished it had no bed. Delayed and weary, ourselves and the car plastered with mud, we reached Starved Rock at supper time and were disappointed to hear that camping was not permitted, so we had to content ourselves with just a peep at the park to find a camp site before dark, a little past Utica in a pretty pasture.

Sunday, the 24th of June, was clear and we made an early start, cutting across by unmarked roads to Princeton, where we struck the Cannon Ball trail. I had never before felt any ecstasy about a cannon ball, but this one was a real friend, our first marked trail, and very well marked at that. This we followed to Bushnell, having lunch in a rural school yard near Galesburg. All day we passed local motorists in clean, shiny cars which had been at home under cover the day before, while our car looked for the time being like a tramp. From LaHarpe to Hamilton we had unmarked roads westward. Along the picturesque valley of Crooked creek were some stretches with clay seep holes, very, very sticky from the rain. We were not stalled, though others were. A little later, in turning around, the earth at the edge of a ditch of water caved in and our rear wheels settled in. Strangers are kind and we soon had three cars of motorists in their best Sunday clothes halted sympathetically around us. One car tried to pull us out, but a similar ditch on the opposite side prevented. Finally stovewood borrowed from a farm and used to pave the ditch, four men pushing the car and as many more pulling on the tow rope got us out. Our thanks and apologies for the mud splashed on their clothing were all these kind people would accept.

On Plowed Paths

In another place we found a short stretch plowed up in high ridges of sod. It was again a misdirection and we could not turn around until the ridges were shoveled away. At 8 o'clock we rolled up at the parental homestead. With a better knowledge of the roads and more experience with driving we should have been in by mid-afternoon. After a visit we left on July 10, following unmarked roads south to Quincy, thence across the wide bottom lands of the big river still southward to a point opposite Hannibal. The last few miles were riotous with trumpet creepers covering all the fences and draping the trees, their graceful flame-colored bells in happy relief against glossy green foliage.

We entered Hannibal, Mo., by the railway bridge across the Mississippi. The



Route followed to Colorado and back, with camping places indicated by circles

Coffee, bacon and 'taters,
with tent cot bed inside canvas

town looks old and sleepy, rather southern, and it is most widely known as the old home of Mark Twain, who immortalized it through his tales of Huck Finn and Tom Sawyer. Here we started southwestward across beautiful wooded hills, following the University trail to Columbia. Our camp that night was near Perry, in an open spot opposite a country church and graveyard, probably the hitching ground. There were trees and a sluggish river in the background and horses in a neighboring pasture who thundered up several times during the night to stick their heads over the fence and gaze at us curiously. Prowling dogs also visited us. Once a white figure in pajamas gave chase. Anyone passing after a night with the boys might have thought a ghost loose from the graveyard. In the morning we found the canine had taken our bread with him in his flight. We had been unable to find any butter in the stores at Perry, so for breakfast we had to fall back upon crackers spread with jelly.

Into Sunflower State

At noon of the 11th we reached Columbia, spending the afternoon at the state university and camping in a pasture beyond town. The 12th saw us following the National Old trail, a portion being the Boone's Lick trail. Near Midland we passed the wreck of a cyclone. At Booneville we were ferried across the Missouri river. From this point to Kansas City we were approximately parallel with that river, though not in actual sight. Camping near Levasy we reached K. C. before noon of the 13th of July. There we spent the remainder of the day. It is a trying town to strangers, as the business streets are narrow, unmarked as to name and very steep. The boulevards leading to Swope park are beautiful and splendidly surfaced, but the lack of street signs made them hard to follow.

Crossing the Missouri river again we left the Show-Me state, with its beautiful hills, inferior roads and very poor bridges and culverts, for the better highways and splendid concrete culverts and bridges of the Sunflower state. Our first camp, the night of the 13th, lay east of Bonner Springs, Kan., between the road and the railroad. At midnight rain set in and continued until the middle of the morning. From Bonner Springs to De Soto we skidded often on the slippery clay hills which were often over-crowned. At De Soto we bought breakfast and a set of chains for the front wheels, which in another hour we did not need. Following the Golden Belt and roughly paralleling the valley of the Kansas river we passed through Topeka and Lawrence, where we visited the Kansas state university and camped near St. Mary's. Here a farmer entertained us with an inspection of an oil well across the road. We have often wondered whether they actually struck oil. Early in the morning, Sunday, the 15th, we pitched camp near Manhattan, set up the tent for the first time since using it for a garage in Hamilton, Ill., and had hot baths. We spent most of the day airing bedding, sorting out clothes, washing the car, etc., and in the evening rode through the town with the farmer who smilingly had allowed us the use of the camp site. We spent a day visiting the state agricultural college.

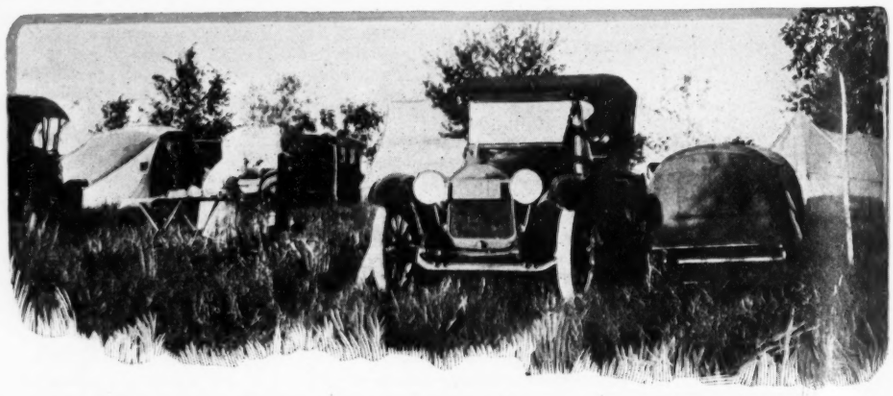
The next day we started west and passed through Abilene and Salina on the Golden Belt, turned south across the mesas at Wilson, camping in a lane 14 miles south. We were quickly over the Sunflower trail almost directly south to Ellinwood, where we struck the Santa Fe trail, a part of the National Old trail, following it westward to Pueblo, Col. In Eastern Kansas, in the mud, we had scoffed at the idea that Kansas was a dry state, but now we granted the statement. Reaching Dodge City in the early afternoon we made a visit of several days, starting west again on the 21st. Our car felt the altitude, but we did not get the carbureter readjusted until we reached Pueblo.

Our first camp in Colorado was at Lamar, in the irrigated valley of the Arkansas river, which the Santa Fe trail follows to Pueblo. The mosquitos and the dust are our most vivid remembrances of this camp. By the middle of the afternoon we passed out of a hot and dry land of great open spaces and found in Fairmont park, Pueblo, a charming oasis. The next day we journeyed north to Colorado Springs over a splendid road and spent most of that day riding around the Garden of the Gods and the towns of Colorado Springs, Colorado City and Manitou. It was because we had spent many days there the year before that our halt was brief, for the sights merit more time. That night we enjoyed the hospitality of the Springs at Prospect Lake, the free camp ground.

Small Wyoming Towns

The following day led us into Denver, where we set up our tent again and spent several days in the Denver City park, with a side trip to her superb mountain park one day. We feel that doubtless the Lord could have made a choicer spot than Rocky Mountain park, but doubtless He never did. We soon hastened northward, entering the picturesque canon of the Thompson river west of the last of the foothill or plains towns, Loveland. The canon is about 21 miles long and 3 miles beyond is the valley of Estes Park, privately owned, with the village of the same name as its town. About 4 miles beyond the town, within the limits of the Government park, we camped for three weeks under the pines, with water and trout from a nearby brook, taking daily motor excursions over the roads that lead through many valleys. We were always in sight of the perpetual snow patches on the real Rockies, with Long's Peak, the giant, as its best known mountain. The 17th of August we pointed the nose of our car eastward and said, "Home again, home again, jig, jig, jog." That night we spent on the open plain near the edge of Cheyenne, Wyo.

The towns to the eastward in Wyoming were small and our eyes wearied for the sight of trees. Scrub cedars on an eroded



Breakfast time at Prospect Lake tourist camp saw stove and table in commission

One of the several beautiful inns where motorists find entertainment in Denver's mountain park. This is called the Flying Horse Inn

hillside near Pine Bluffs, about the state line, were the first native trees since leaving the mountains. Riding 159 miles on this 18th of August brought us to Big Springs, Neb. On the street we chanced to meet a man who had camped next us two weeks earlier, who offered us the hospitality of his yard, fuel and pump. At 5 a. m. the next morning it was but 62 deg. This day's run was 157 miles to Lexington, Neb., where a rain made the road so greasy that we stopped and camped on the wide right-of-way of the Union Pacific. Freight trains all night long gave some estimate of the immense amount of freight handled. Through most of Nebraska the Lincoln highway follows the course of the Platte river, but the river itself mostly was invisible or showed only sandbanks. A late start on the 20th cut us down to 117 miles, with camp near Central City, Neb. Passing through prosperous, pretty Kearney we recall it as a town which would be attractive as a home. By Central Nebraska we found groves of tall cottonwoods planted around the farmsteads, while Eastern Nebraska had real, native trees, and the topography suggested Iowa. The 21st carried us out of Nebraska, through beautiful Omaha in a rain, and held us up in Council Bluffs, Iowa, with a puncture. With delays we reached Missouri Valley, Iowa, for camp, finishing 148 miles. The 22d had an experience we would not have missed. The L. H. follows a valley, but we made a wrong turn and lost ourselves in the wonderfully beautiful hills in the western part of the state, recovering our trail at Woodbine. Despite the hills this detour found fine road surfaces and fertile farms. Late in the afternoon we made a short detour to visit a progressive rural church near Beaver, camping near Boone, Iowa, 156 miles recorded for that day. Eastward on the 23d, about 40 miles, passing through the attractive campus of the state agricultural college at Ames, we halted at State Center for several days, with a side trip down to the state capital at Des Moines.

The Best Long Stretch

The very best long stretch of road we met all summer was the L. H. from Omaha to State Center. It was mostly of earth, properly graded and conscientiously dragged after rains. East of there it was probably as good but was being worked when we passed. The 28th of August carried us over the L. H. to Cedar Rapids, 90 miles, thence south, 30 miles, on the Red Ball to Iowa City, the site of Iowa's state university, on the Iowa river. Here we stopped to revisit our Alma Mater and were the guests of friends. On the 30th we had a pleasant run south over the Red Ball, which I must record as of splendid surfacing of earth wisely graded and dragged, to Keokuk, in the extreme southeastern corner of Iowa, crossing the new double-decked bridge over the Mississippi to Hamilton, Ill., 104 miles by nearly afternoon.

A brief halt proved to old friends that we had safely survived the trip without wreckage. Sunday, the 2d of September, saw us speeding homeward, racing the menace of a rain. In 211 miles we reached the macadam at Earlville ahead of the shower and camped by the side of the road. Labor Day, the 3d, we followed the bumpy macadam home, 87 miles, to our own garage. People said we were brown as Indians but we were so happy we did not mind.

A peek at the cashbook to give you an estimate of what it may cost you if you wish to follow suit. You can spend much more and it is possible to do it for less, even for the same time and distance. With the lighter, cheaper cars, tires cost less and gasoline bills are lower. If your journey is shorter than ours you can stand more crowding and put up with more makeshifts in equipment. Further, values are relative and personal and you will probably wish to spend more than we did for some things and less for others. If the man of the party is a good mechanic he can save expenses by attending to many little tinkering jobs himself instead of hiring adjustments and minor repairs taken care of at garages. Good driving often reduces the cost of gasoline and results in the need of fewer repairs. Prices of equipment, accessories for the car and food for the party will vary in different parts of the country.

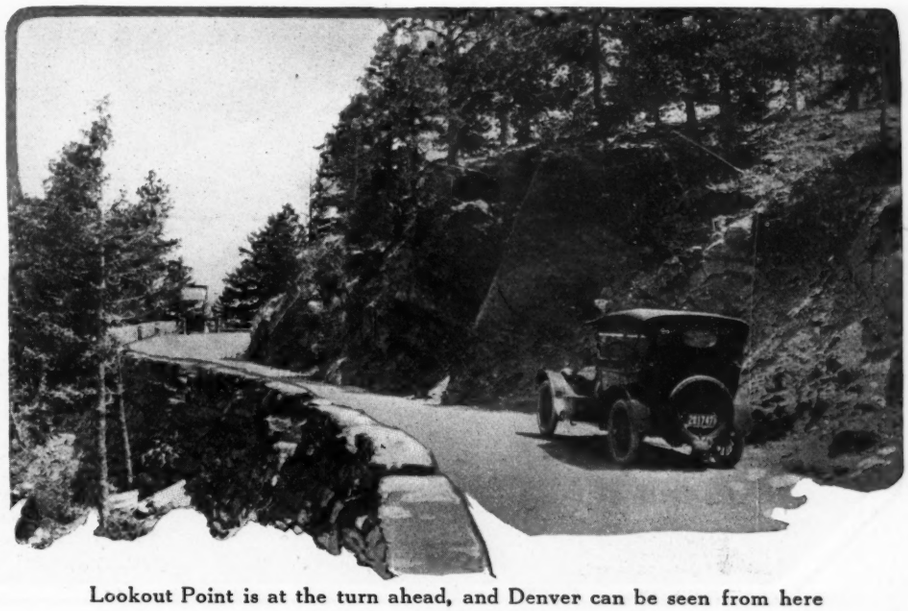
The direct expenses of our trip, money spent enroute, two persons for seventy-two days, riding 4044 miles, were $186.54, divided as follows: 272 gal. gasoline, $61.95; miscellaneous car expenses, $52.30; food for two for forty-seven days of the trip, $31.74; ice on the outbound trip and half the way back, $2.23; kodak expenses, films and developing, $14.43; fishing in Rocky Mountain National Park, $3.55; postage and magazines, $3.85; personal, $14; miscellaneous small items, $2.49.

A few details of the list may interest you. Our list of miscellaneous car expenses included all operating expenses of the car other than gasoline, as oil, repairing one blow-out, $5.50; about half a dozen punctures, at 25 cents to $1 for the same work; one new pair of chains; replacing broken horn bracket; garage storage when visiting friends; bridge and ferry tolls, at 15 cents to $1; distilled water; cleaning out carbon; carbureter adjustments; replacing broken tire pump; patching damaged upholstery.

Fishing Cost

The kodak expense would have been larger save that my husband made all his own prints in the fall. The fishing cost was for license and flies, as the rod and reel we already owned. The total net results of this fishing expense were seventeen delicious trout, about 8 in. long, just safely above the legal limit. Personal items included laundry, barber bills, a little amuse-

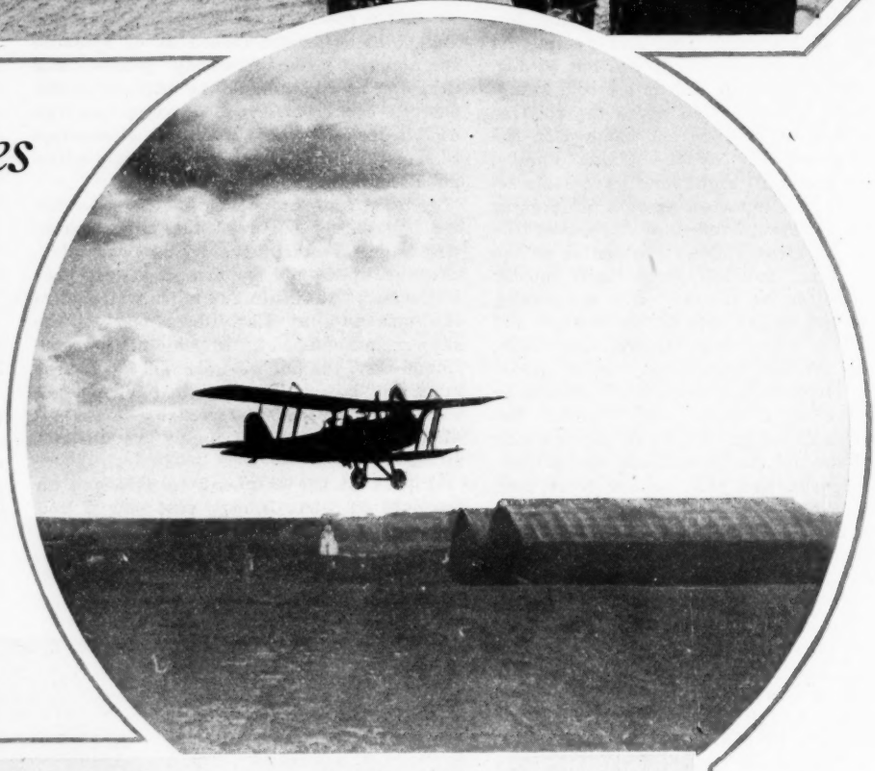
(*Concluded on page* 29)

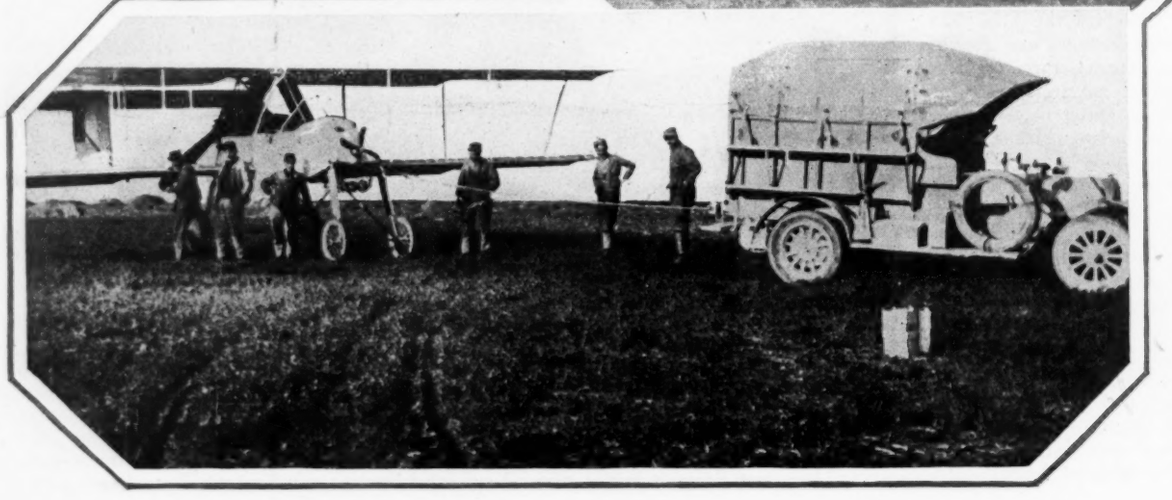


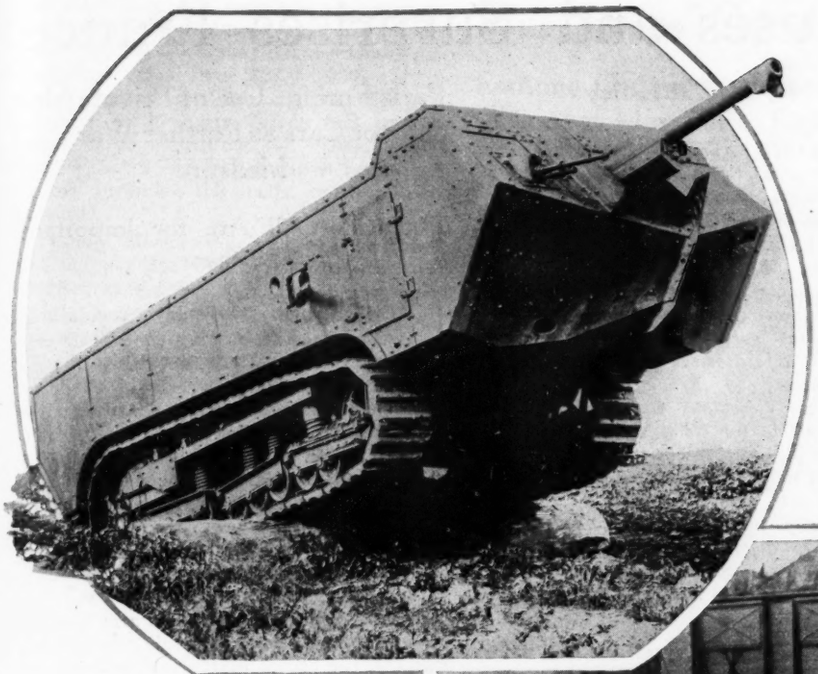
Lookout Point is at the turn ahead, and Denver can be seen from here

Stars and Stripes with Allies

Old Glory in the land of Lafayette. Above—Great American motor assembling parkway in France, where cars shipped abroad are put together. In circle—Reconnaissance plane returning at sunset on the Western front. Below—A disabled French airplane is being towed to its hangar from its landing place by an army motor truck. The plane landed several miles from home—unable to fly

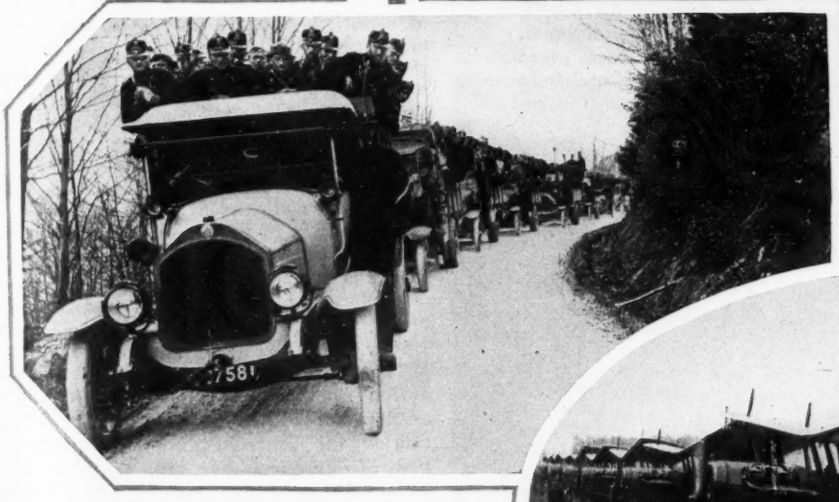






This striking photograph is an excellent camera reproduction of one of the newest French tanks in action. This type is known as the St. Chamond and is strikingly different from the type used by the British, who originally used this modern warhorse weapon

First picture of American soldiers in the Aisne sector. Here American soldiers are assembling their artillery on arrival in the Aisne sector



The Swiss army is very alert. A motor transport is shown on its way to the border with Swiss soldiers

Though every air squadron has its mechanicians who keep the machines in condition, the students spend days studying the engines and making repairs. Eight weeks in actual flying is preceded by stringent examinations, both mental and physical, and eight weeks in the classroom for study of theory

Racing Report Amuses and Surprises France

Automobile Club of France Will Resume Kerosene Engine Test This Month

Abandoned Competition at Beginning of War

PARIS, April 1—After a lapse of nearly four years the kerosene motor competition of the Automobile Club of France, abandoned at the declaration of war, will be held the first week of May next. Three prizes, of $10,000, $2,000 and $400, are offered for the most satisfactory motor car engines running on kerosene only. Gasoline can be made use of for starting, but no special tank must be necessary for this fuel.

The competition comprises both a laboratory and a road test. On the bench there will be a 3-hr. fuel test at full load; a 3-hr. fuel test at half load, at the same number of revolutions as for full load; a 2-hr. fuel test at half speed; and finally a 2-hr. fuel test at full speed without load. Before the test the competitors will be allowed half an hour in which to prepare the engine and carbureter, but actual starting must not occupy more than 10 min. To qualify in this test the consumption must not exceed 350 grams per horsepower-hour, and no engine must weigh more than 33 lb. per horsepower. All engines qualifying in the preliminary test must be put back into their respective chassis and run in a road test a distance of about 600 miles in four days. The weight of the car must be 2800 lb. minimum, without driver, fuel and oil. Disqualification will follow a lower average speed than 18 m.p.h., but no account will be taken of a higher average; speeding will be discouraged. A military officer will be placed aboard each car as observer. The amount of fuel and oil consumed will be noted.

Awards will be made on points, taking into consideration the consumption per ton mile and regularity of running. Only French carbureters or appliances are eligible. The engine can be of foreign construction. Density of kerosene used is 810-820 and minimum flash point 35 deg. Cent. in Garnier apparatus.

TO FILL BOSCH ORDERS

New York, April 27—The Bosch Magneto Co., which, as was announced in the issue of last week, has been taken over by the Alien Property Custodian, desires to advise that arrangements have been made with the Alien Property Custodian for representation on the board and that there need be no occasion for concern of any of its customers about unfilled orders or its continuing business as usual.

HOWER IS NAVAL MANAGER

New York, April 29—Henry H. Hower, who for three years has been connected with the Willys-Overland Co. in the sale of Willys-Knight cars, has been appointed production manager of the Naval Base at New London, Conn.

By W. F. Bradley

PARIS, April 1—The statement, just received here through MOTOR AGE, *that the four drivers, René Thomas, Albert Guyot, Arthur Duray and Jean Chassagne, have signed contracts to race in America this season is one which raised amused surprise. In America such a statement may arouse interest; in France it only makes ridiculous the man responsible for its utterance. It is a pity that statements of this mad nature ever are allowed to get into print, for they are so utterly ridiculous that they throw discredit on the whole motor car racing organization of the United States.*

Here are the facts. Thomas, Duray, Guyot and Chassagne never have received any communication or offer from the Wellman-Pickens group. The only racing Peugeot in France is Duray's 1914 *Baby Peugeot, but it has a cracked cylinder which cannot be replaced. Arthur Duray is a volunteer soldier in the French army; he cannot leave France. René Thomas was called up for military service, but owing to his lack of military training, was put under military law in his own factory. Jean Chassagne is a military air mechanic. Owing to the state of his health, occasioned by a flying accident, Albert Guyot has been given one year's sick leave, and is in partnership as a consulting engineer. He could only leave France with a special military permit. Finally, the Automobile Club of France would permanently disqualify any man taking part in racing while the war lasts.*

If any further reports are announced of European drivers coming to America they can be denied forthwith.

There are two Fiat and two Sunbeam racing cars in Europe at the present time. But neither Fiat nor Sunbeam has any intention of sending them across the Atlantic. Jack Scales, who had arranged to bring one of the Fiats to America last year, is attached, under military control, to the American army in France as expert on Fiat motor cars owned by the A. E. F. His teammate, Fagnano, is mobilized at the Turin factory.

Paris Forbids Use of Private Motor Cars as Further War Measure

Practically All Are for Important Business

PARIS, April 3—To-day regulations were issued forbidding the use of private motor cars in Paris, declaring that no motor cars should pass beyond the city walls and further stating that any car found beyond the zone limited by the belt railroad would be confiscated immediately.

The regulations are an ill-considered and impracticable attempt to arrest an imaginary evil. The private cars in service in Paris are practically all used for very important business and cannot be withdrawn without serious inconvenience to the nation. To close the gates of Paris against motor cars is an impracticable proposition. Further, the choice of the belt railroad as the limit within which cars provided with passes shall operate is devoid of all reason. This belt railroad at some points is only 3 or 4 miles from the city walls; at other points it is 20 miles away. Thus in one direction all the suburbs can be reached; in another direction important suburbs of Paris are shut off to motor cars, though they are open to trolley cars, railroads and other means of locomotion.

When the new and drastic laws were published the general public imagined that Paris would immediately be swept clean of motor cars. There is no apparent difference in the number of cars on the streets. Taxicabs and motor buses are running as usual. The central police offices are full of motorists claiming permits to travel by motor car, and the authorities will have to give these permits, for to refuse them would tie up national industries. If the authorities responsible for the regulations had taken the trouble to travel over the roads of Paris and suburbs they would rapidly have convinced themselves that joy riding was non-existent and that no further reduction in the number of cars could be made without reducing the productive ability of the nation.

C. J. BUYS HORSELESS AGE

New York, April 30—Special telegram—The Class Journal Co., publishers of MOTOR AGE, has purchased *Horseless Age* of New York, the oldest motor car publication in the United States. The publication of *Horseless Age* will be continued under the new management. The Class Journal Co. also publishes *Automotive Industries, Motor World, Commercial Vehicle* and *Transfer and Storage.*

OVERLAND TO ENLARGE WORK

Toledo, Ohio, April 25—The Willys-Overland Co. is now ready to proceed with the manufacture of war products on an enlarged scale. The company plans to increase its working force from 12,000 to 15,000 men at once. For some time past Willys-Overland has been installing spe-

cial machinery and reorganizing parts of its plant for Government work, for which it is stated the company has contracts aggregating more than $27,000,000. It is manufacturing airplane engines and gun carriage parts at its Toledo factory and has a large shell contract. Officials announce that a new building will be started shortly in which the shells will be manufactured.

During March the company produced and shipped 832 Curtiss training engines. Unfilled orders for passenger cars greatly exceed those of a year ago at this time, aggregating 18,000 cars. The present output is 500 cars a day, and it is expected that the output will be greatly increased. Production for the present year is placed at 115,000 cars, as compared to 140,000 last year.

552 BUY MICHIGAN FORDSONS

Lansing, Mich., April 29—At the close of the Michigan War Preparedness Board's campaign for the sale of Fordson tractors in Michigan at midnight, April 27, a total of 552 orders for tractors had been received. This is all that will be taken of the 1,000 tractors apportioned to Michigan, as the state assumed no obligation to deliver more tractors than those actually ordered and paid for up to the close of the drive. About twelve carloads still remain to be shipped from the Ford factory and delivered to the buyers, but these will have been delivered within a few days as the orders have been placed with the factory.

NO RUBBER EMBARGO YET

New York, April 29—The rubber situation in the United States is inseparably linked up with ship tonnage, and for this reason the rubber trade would not be surprised if a partial embargo were placed on imports. As yet no official communication has been made with regard to this matter.

The Shipping Board is understood to be still considering the data and information placed before it as a result of the hearing given the rubber trade last week.

Reports have become current that rubber mills will be requested to devote a considerable proportion of their facilities to the manufacture of rubber footwear for the army. It is not clear exactly where this report originated. Rubber manufacturers, however, are not greatly concerned over it, as only about 10 per cent of the rubber imported is used in producing footwear. Tires take about 70 per cent, and the balance goes for mechanical devices and sundries.

The United States Rubber Co. is the largest producer of rubber footwear, and this company with the Hood Rubber Co., produces probably 90 per cent of all consumed.

It is pointed out by rubber importers that any kind of rubber can be used for footwear whereas certain grades are most suitable for tires; the use of these grades for footwear would be poor emciency.

The transportation difficulties which up to the present time have checked the receipt of rubber in Akron and other centers rapidly are improving.

War "Jumps" Grand Prix

Famous Course in France Now Scene of Most Bitter Fighting of Struggle

Historic Headquarters of Sunbeam Destroyed

PARIS, April 2—The most bitter fighting of the war is now taking place on the 1913 Grand Prix course, just outside the town of Amiens. According to the French official communiqué, issued on Easter Sunday, the village of Moreuil was captured by the Germans on the previous day. It was retaken by the French; it was lost again; finally, French and Canadian troops, their ranks mixed, made an irresistible bayonet attack which drove the Germans completely out of Moreuil, then harassed them through the woods to the north of the town, where prisoners were taken and machine guns captured. According to officers who took part in these operations the slaughter was greater than the most bloody fights on the Yser.

Moreuil is a village situated on one of the corners of the triangular course used for the 1913 French Grand Prix race run on a limited fuel allowance. The shortest of the three legs of the course ran through the woods to the north of Moreuil to which the Germans were driven and captured. This short leg terminated in a down grade at the end of which was a right-angle turn, just inside the village of Moreuil, followed by a stiff rise and the straightaway to the grandstands.

It was near this point that Albert Guyot ran over his own mechanic, this entailing delay which cost him the race. The 1913 Grand Prix was won by the late George Boillot. The Peugeot, Delage and Sunbeam cars which came to Indianapolis in 1914 all ran over the course which is now a battlefield. A fine historic old chateau, near Moreuil, which was the headquarters of the Sunbeam team in 1913 has been entirely destroyed in the fighting.

Louis Wagner's Mercedes racing car, which won second place at the Lyon Grand Prix in 1914 is to be offered for sale by auction this week by the military authorities.

After the Grand Prix race, run a few weeks before the declaration of war, Wagner drove the Mercedes to Paris. It was on exhibition in the German agent's showroom in the Champs Elysées when war broke out. Immediately the car was requisitioned and after being used a little time for carrying dispatch was placed at the disposal of Captain Petiet, chief of the general motor car stores, who made use of it on his visits of inspection.

To Sell Wagner's Mercedes

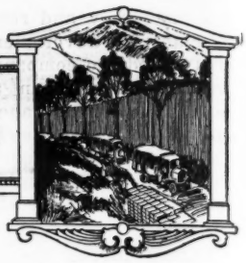
The car has had very little service and is still fit for racing. It is being offered for sale because it is too fast for military work. As an army runabout it has not been found to be an extravagant car, for its gas consumption is equal to 14 m.p.g.

FRENCH WAR GAS RED

Paris, April 1—All military gasoline used by the French army will be tinted red from to-day to prevent its getting into civilian hands by illegal means. A product has been found which will give the gas a distinctive color without injuring its qualities in any way. In one of the army services at the rear red gasoline already has been tested with the result that the average consumption dropped immediately. This proved that not unimportant quantities of gasoline had been sold or given away to civilians. No person was found willing to have red gasoline in his possession.

Grand Prix course, scene of some of the most bitter fighting of the war

EDITORIAL PERSPECTIVES



Can You Identify Your Car?

MOTOR car thieves we will have with us as long as we have motor cars. No matter how strenuous the efforts of police departments and vigilance committees, motor cars always will offer a comparatively enticing opportunity for the thief. Protection from thievery is a relative condition, for the lock which will foil a thief on a busy street may not worry him if given several hours unmolested.

THERE are three things which the car owner can have, any of which help and all of which together should prevent dreams of motor thieves. These are locks, insurance and knowledge of the identification marks on his own particular car. The last is the least frequent and none the less important. The Velie company makes the following suggestion: "In addition to a general description of the car, its make, color, capacity, peculiarities, etc., be able to give the license and motor numbers—in fact, all numbers which appear on the different units. Be able to describe the top, the makes, size, tread and serial numbers of the tires, the car equipment and special marks which may exist in places unknown to others than yourself." If you will keep these items in your memo book, chances of recovery in case of theft are vastly increased.

Kid-Glove Motorists Decrease

NATURAL war demands for skilled labor have drawn heavily on the motor car mechanics. The repair shops and service stations in particular have lost much of their best help. It is natural—they are just the men most valuable in taking care of the planes and trucks of the army. More will go. Still more would be gone before this if the home demands for service were not so pressing.

RECENT action of the National Automobile Dealers' Association in suggesting to the War Economy Board that many mechanics could be released if motorists would attend to the minor care of their cars themselves may bring about a definite reduction in the service available. Most of the service now asked by owners is such that they could do themselves with a little study, a little energy and a little care.

BUT they will have to get their hands dirty. Such care will not be a kid-glove job. The true motorist likes to know that he is capable of making his own repairs, and for the other kind of car owner the knowledge that he is releasing men for important war work may in part make up for dirty finger nails and scratched knuckles.

Let the Enemy Build Our Roads

ONE of the favorite subjects for the cartoonists nowadays is the interned enemy alien. Usually he is pictured lolling in ease, without a care, fed and protected by the Government he has threatened. Soon he will be joined by the thousands of prisoners who will be shipped to this country till after the war. They will have to be fed. How can they earn their keep and be prevented from becoming a still greater burden on account of illness? They will be a drain on the resources of the country unless they are put to work and made an asset instead of a liability.

IN MANY lines of work their employment would be unjust in its competition with free labor. Other lines of work are suffering now and will suffer more on account of the lack of man power caused by the war. One such line of work which is being retarded is the building of roads—a work whose necessity will be forced more strongly on the Government as the need of increased transportation facilities becomes more urgent. Road building offers an ideal outlet for the formerly misplaced and now latent energies of the interned alien enemy. It will offer an ideal occupation for the enemy prisoners.

THERE is no novelty in this idea. Every army in Europe is using its prisoners for the building and maintenance of roads at the front and behind the lines. Is there anything illogical in employing them in road work 3,000 miles behind the lines as well as 30 miles behind the lines? Is the last 10 miles of highway over which munitions are carried any more vital than the first 10 miles?

The Motor Truck's Day

THIS is the motor truck's day, not the horse's. For the horse, too, is paying his toll on the battlefields of the great war and for him there are no countless substitutes such as the truck can be furnished with. It is figured that 1,490,000 horses and mules were exported from the United States during the last three years. The value of the horses exported between August, 1914, and the last of July, 1917, was $215,000,000 and that of mules, $66,000,000. As a consequence the contractor who formerly performed the jobs taken on with horses now requires the motor truck. The lumber operator from whose mills two-, four- and six-horse teams hauled the lumber for shipment by rail must have motor trucks to supply the void left by the commandeering of horses for war work. The miner turns to the motor truck. The road builder is using it. And the Government gradually is motorizing, as far as possible, the Army.

Snow's Busybodiness

A FEW of the states already are preparing to keep their roads clear of snow this winter. But not enough of them are making these preparations. It must be because few of the states realize the effects snow, combined with the heavy traffic the roads are subjected to winter and summer now, leave behind them. Roads that last fall were almost perfect specimens now are worse than back-country roads since the spring thaw. Detours will be necessary on many of them for the next two months, at least. And this with trucks going and coming all the time. The Government has ordered an additional 8000 Class B motor trucks, together with 12000 other trucks. The first order of 10,000 Class B trucks is coming through at a good pace. Night driving from the factories of the Mid-West to the seaboard has started. And snow has, with the aid of the heavy traffic, prepared two months of detours over some of our most necessary roads.

Copper King Heads Aircraft Work

John D. Ryan to Have Charge of Production and Act in Advisory Capacity Also —Overman Bill to Co-ordinate Activities

WASHINGTON, April 29—The airplane situation still presents considerable confusion, although there are prospects of a clarified atmosphere soon. The appointment of John D. Ryan as administrator of aircraft still leaves opportunity for a muddle unless proper legislation is granted by Congress. At present Mr. Ryan is in exactly the same position as Howard Coffin found himself. Under Sec. 4 of the original law outlining and operating the aircraft board and telling the power of the board it was stated "that the board is hereby empowered under the direction and control of and as authorized by the Secretary of War and the Secretary of the Navy respectively on behalf of the Departments of War and Navy to supervise and direct in accordance with the requirements prescribed or approved by the respective departments the purchase, production and manufacture of aircraft, engines and all ordnance and instruments used in connection therewith and accessories and materials therefor, including the purchase, lease, acquistion or construction of plants for the manufacture of aircraft, engines and accessories, provided that the board may make recommendations as to contracts and their distribution in connection with the foregoing, but every contract shall be made by the already constituted authorities of the respective departments."

This provision, it will be noted, left the aircraft board in only an advisory capacity. To overcome the present shortages of power and to grant Mr. Ryan a complete executive control an amendment to the Overman bill would authorize the President to establish an executive agency to control aircraft and to transfer funds appropriated for aviation purposes.

Complete Control

This amendment will allow Mr. Ryan complete and absolute control of the production, including placing of contracts. This is in line with the suggestions made by the Marshall committee, which in its report stated that airplanes, like ships, should be built by one authority and operated by another and that the operating authority should not interfere with production. Following this plan, the President has appointed Mr. Ryan as the executive head of production, leaving W. C. Potter as the actual production manager, while Brigadier-General Kenly will have complete charge of the training of aviators as an entirely separate division from production.

The naval consulting board has adopted a resolution as an appreciation of the work of Howard E. Coffin, stating that Mr. Coffin was foremost among the few men who had vision, foresight and imagination to recognize the hugeness of our airplane program and who were capable of organization for the expenditure of the vast sums necessary for aerial equipment. Mr. Coffin has retired to his Southern farm for several months.

The general impression in Washington is that there will actually be very little change in production plans and no change in engine design under the new aircraft regime. Many take the view that owing to the widespread senatorial denunciations, the Administration had to do something to appease the public mind and appointed Mr. Ryan, who will allow the original plans to proceed much along the route first laid out

Mr. Ryan is president of the Anaconda Copper Mining Co. and has been prominent in the copper field since 1907. He has been responsible for the management of the largest single copper unit in the industry, first as head of the Amalgamated Copper Co. and later as president of the Anaconda, which absorbed the Amalgamated in 1914. His first intimate contact with the Government was just before the United States entered the war, when copper was scarce and selling at 30 cents a pound. Through conference with Bernard A. Baruch and large copper producers Mr. Ryan succeeded in obtaining for the Government a large supply of copper at 16⅞ cents a pound. Later he went to Washington as chairman of a sub-committee of the War Industries Board and in June of last year became chief assistant to Henry P. Davidson, head of the Red Cross work, succeeding Col. Jefferson R. Kean, who was recalled from his assignment to assist the Red Cross and ordered to take command of the United States army ambulance sections at the front. Mr. Ryan will have dual functions. He will not only be director of production but chairman of the aircraft board, in which position as advisory on questions of production to the Signal Corps Mr. Ryan as its chairman will be adviser to himself as director of production.

John D. Ryan, administrator of aircraft

Signal Corps Changes

In the appointment of the new director a reorganization of the aviation section of the Signal Corps also has been effected. General Squier, as chief signal officer, will devote his attention to the administration of signals. A division of military aeronautics is created under the direction of Brig.-Gen. William L. Kenly. The arrangement is made with the entire concurrence of Howard E. Coffin, who remains a member of the advisory commission of the Council of National Defense and will render assistance and counsel to the aircraft board and Mr. Ryan.

The division of military aeronautics will have control of the training of aviators and the military use of aircraft. The exact division of function in designing and engineering will be worked out between the divisions of military aeronautics and the division of production. At the same time there is no change in the personnel of the present equipment division of the Signal Corps, which will continue under the direction of W. C. Potter.

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145 MILES IN AN HOUR

Washington, April 27—What is claimed to be a new speed record for airplane was made by an Italian aviator who flew from Langley Field, Hampton Roads, Va., to Washington in an hour. The distance is 145 miles. Sergeant Cianfelice, the pilot, used a Spa fighting plane on the trip.

20,000 Trucks Ordered

Class A and AA Models Shelved by Lack of Shipping Space

Board of Control Cuts 37,000 Requests

WASHINGTON, April 27—The Board of Control, recently appointed to supervise truck activities, has approved orders for 20,000 motor trucks for war purposes. This includes 8000 Class B standardized trucks; 8000 four-wheel-drive, which are made up of 3500 Nash Quads and 4500 F-W-Ds. In addition orders for 1500 ¾-ton G. M. C. chassis have been approved for ambulance work, with 2500 1½-ton chassis of standard designs.

The inclusion of the G. M. C.s and standard chassis is taken as indication that the A and AA standardized trucks of the Quartermaster's Department have been shelved. It has been apparent for months that great opposition has been directed against the standardized trucks, but this order is the first definite indication that the manufacturers who offered this opposition have succeeded in blocking the standardized truck program as far as the ¾ and 1½-ton models are concerned. The Ordnance Department planned to place contracts for 20,000 F-W-D and 12,000 Nash trucks, while the Quartermaster Department planned to purchase 15,000 Class B trucks in addition to the 10,000 already in production. However, the Government recently decided to cut 37,000 orders for war trucks off due to lack of shipping space.

Class B production is gaining. The Government has accepted 190 of these trucks, and more than a week ago 455 were waiting to be accepted, making 645 that have been completed for some weeks. It is expected that 745 will be assembled this month by the fourteen makers who are assembling them. The schedule for May ranges from 1500 to 2000; June, 2500; and July, 3500. The date for the completion of the first 10,000 has been extended from July 1 to Aug. 1, but it is expected they will be completed by the middle of July.

To date it is estimated we have shipped about 5000 trucks for our army in France and purchased about 9000 from the Allied nations. Many of these foreign makes have been Fiats. The others are very largely from Great Britain.

MARTIN PLANT ABOUT READY

Cleveland, Ohio, April 27—It is expected that during this week the Glenn L. Martin Co. will occupy its new plant located on its 68-acre tract on the Nickel plate railway. The factory site was leased Feb. 21 for ninety-nine years. Feb. 26 the contractors were at work on the plant and in twenty-nine days had the complete superstructure in place. The company has been housed in temporary quarters during the interval where they have been engaged in getting equipment together and tooling for the manufacture of an advanced type of fighting airplane of its own design. During the period of the war the Glenn L. Martin Co. will devote its entire organization to the production of aircraft for the United States Government and at the close of the war it is intended to go into extensive production of commercial airplanes.

The field adjacent to the plant is sufficiently large to be used for flying and testing purposes. The first unit of the building is 220 by 300 ft. and costs about $200,000. A second unit will soon be put under way, increasing the floor space to 216,000 sq. ft.

Chicago Truck Train

CHICAGO, April 30—The first motor truck train to enter Chicago will arrive here to-morrow morning. These are five commercial vehicles with pneumatic tires, units in the Boston-Akron express service the Goodyear Tire & Rubber Co., Akron, inaugurated a year and a half ago.

The five trucks, loaded with tires, tubes and other accessories for the local Goodyear branch, will be met on the outskirts of the city by members of the Chicago Automobile Trade Association, the Traffic Club of Chicago and the Chicago Association of Commerce and escorted down Michigan boulevard to the terminus of the arduous trip across Ohio and Indiana. On their trip from the city limits they will carry Liberty Loan banners.

While the roads are in wretched condition, the train is making the trip without accident and the drivers had made schedule time in the long pull through the mud and rain.

The following trucks comprised the train: 1½-ton Packard, 3-ton Packard, 5-ton Packard, 3-ton White and 3½-ton Mack, with a total carrying capacity of 16 tons.

Thursday morning the trucks will start on a long journey to the Atlantic seaboard, with Red Cross supplies to be shipped at once to Pershing's troops in France. The supplies consist of sweaters, socks and other knitted articles the organization has been unable to transport by railroad because of the paucity of freight cars on the eastern roads.

One of the trucks in the train will be utilized for carrying a field kitchen trailer, which will be attached to a Red Cross ambulance on arrival in France and used for preparing meals for the American soldiers in the front line trenches. Meals for 400 men can be cooked on this field kitchen or enough coffee for twice that many.

The trucks will be guarded by a detail of soldiers at night, when they will be parked on the lake front, and the next morning will be escorted out of the city by a delegation from the Red Cross and a band from the Great Lakes Naval Training Station.

INTERSTATE TO MARKET TRUCKS

Muncie, Ind., April 27—The Interstate Motor Co. will place on the market trucks of the 1 and 1½-ton capacity instead of passenger cars. The discontinuance of passenger car production is for the duration of the war only, after which the company anticipates a greater business in that field than ever before.

No Fresh Curtailment

False Report Based on Meeting That Has Never Been Held

Decision Scheduled for April 29 Postponed

WASHINGTON, April 29—The curtailment report current for the last week is false. Though based on an interview with Baruch no meeting was held. On the other hand a meeting here was scheduled for to-day. It had been known for some time that motor car makers were to meet with the War Industries Board to-day to agree on further reduction. This meeting has been postponed to next week.

The question of the next curtailment in the industry will be considered by the committee of which W. C. Durant is head. The committee will meet then and take up with George M. Peek, the industrial representative of the War Industries Board, and P. B. Noyes, representative of the Fuel Administration, the question of further restriction.

A cut of 20 per cent in production is expected in some circles. While no definite dates covering this are announced it is understood that it naturally would follow the present cut of 30 per cent, which covered the period up to July 31.

COLONEL BAKER IS TRANSFERRED

Washington, April 29—Special telegram—Col. Chauncey B. Baker has been transferred to the quartermaster department at Chicago. No successor has yet been appointed to succeed him as chief of the motor division.

TRUCKS TO MOVE FLEET BUILDER

Washington, April 27—Motor trucks belonging to the United States army will be used to move the office equipments of the Emergency Fleet Corp. from Washington to Philadelphia. The Emergency Fleet Corp. will commence to move May 1 and expects to complete the task by May 15. Some idea of the vastness of this undertaking will be understood by the fact that the Emergency Fleet Corporation occupies thirty-nine buildings in Washington.

DETROIT RETURN LOADS BUREAU

Detroit, April 29—Plans are on foot to establish a return loads bureau in Detroit. Letters are now being sent out to all truck men of this city and truck men and chambers of commerce in the surrounding towns to survey the extent to which Detroit concerns are making use of motor trucks in sending supplies to nearby cities and what assurance there is of enough tonnage on the return trip. Arthur T. Waterfall, traffic manager of Dodge Brothers, is chairman of the transport committee which will have charge of the new bureau.

Several concerns are engaged in this work at the present time. The General Storage & Cartage Co. operates a fleet of three trucks between Detroit and Pontiac,

all three leaving Detroit at 6:30 a. m. every day. Two of these trucks load at one point, and the third picks up shipments before leaving the city. The company has arranged in Pontiac for capacity tonnage for the return trip. The trips consume 3 hr.

The Michigan Warehouse Co. operates a fleet of fifteen trucks between Detroit and outlying towns. This company, however, maintains no schedule but is making efforts to have the trucks loaded on the return journey. Most of the business is done between here and Pontiac. The trucks are operated only when necessary. Sometimes a truck leaves every day and sometimes only two or three times a week are sufficient to take care of the business. The regular rates of this company are 35 cents a 100 lb., but a minimum charge of $1 is asked.

DRIVEAWAYS SOMEWHAT LESS

Detroit, April 27—Manufacturers are still sending out cars overland to nearby points but driveaways to more distant sections have been materially reduced owing to the temporary relief of the freight congestion on outgoing shipments. The Paige-Detroit Motor Car Co. has reduced its driveaways 50 per cent as others have. The Dort Motor Car Co. drives away 40 per cent of its production and the Oakland 50 per cent. Dealers are coming to Dodge Brothers faster than the company can supply them.

The daily production of the manufacturers in this territory is very unsteady, fluctuating according to the amount of materials and parts available. Taken as a whole the output has had a marked decrease. This lack of sufficient materials and parts to work is caused by the inability to get them to the place where they are to be fabricated. Although the outgoing shipping is in a better condition a great deal of difficulty still is experienced on incoming freight, this, to a great extent, being the controlling factor in the production schedules. The other element that is retarding production is the want of labor.

HAL COMPANY REORGANIZES

Cleveland, Ohio, April 27—The Hal Motor Car Co. has been reorganized as the Hal Motor Co., and additional capital has been furnished whereoy the manufacture of the 1918 HAL 12 series will be continued. The remaining property of the defunct company was auctioned here yesterday. One item was ten finished cars. There was considerable in accessories, machinery and furniture. The inventory value was about $200,000.

VESTA TO RAISE PRICES

Detroit, April 25—Word has been forwarded to dealers that the Vesta Accumulator Co. will raise its prices 5 per cent on all batteries, to take effect May 10. The reasons given are the higher costs of labor and the difficulty in keeping a labor organization, due to the draft. For these reasons the Vesta company states that it finds it absolutely necessary to put the advance into effect on all shipments made on or after May 10, 1918, regardless of date that order was placed with the company.

Bigger Business a Need

World's Salesmanship Congress Calls for Growth to Finance the War

Men of Industry on Program of Gathering

DETROIT, April 26—That there must be bigger business than ever in America for a successful prosecution of the war was the principal thought at the Third Annual World's Salesmanship Congress which closed here to-day. "You can't finance a war out of a war," was the way E. Le Roy Pelletier summed it up, and W. F. Steedman, Montreal, won applause when he said Canada had found she had to "keep the home fires burning over here to keep the hell fires burning over there."

That there must be alterations and conversions in certain industries was agreed, but the speakers held that these would come automotically rather than through arbitrary orders.

Norval A. Hawkins, sales manager of the Ford Motor Co., said from a cost accountant's standpoint the Hun empires were bound to lose. He presented a balance sheet of assets and debts of the Allied nations and the Central empires, which showed that the allies can go much further yet from a financial standpoint while Germany and Austria are in a more precarious condition. He hit a popular theme when he declared the Government needs more business men and fewer lawyers and politicians. Several speakers mentioned Charles M. Schwab, recently drafted for ship-building, and each time the congress expressed its confidence in the ability of the man who last year delivered the opening address.

Over-optimism without effort was deplored as a menace to our national safety, but, on the other hand, speakers stated, it is wrong to grieve and groan in our effort to support the war.

Greater harmony between capital and labor was held to be a necessity and several speakers expressed the view that labor must receive greater consideration if real efficiency is to be secured in industry. One speaker stated that the accidents in factories are due 70 per cent to the mental and physical condition of the workers and that proper consideration of the employees would do much to eliminate or reduce this.

A special session was scheduled for advertising topics. The speakers emphasized that advertising is very essential now even with those companies that have discontinued their normal products and are engaged in war pursuits, for advertising, they stated, continues without a break the good will that has been built in the past and preserves for the company a place in the after-war trade. If this place is relinquished and the good will is let to die through lack of advertising, the regaining of the pre-war status will be more costly than its retention by continued advertising effort.

The congress urged the Government to repeal the rider on the war revenue bill which places trade papers and magazines on a parcel post basis. The law provides the second-class matter shall pay on a zone system. This means that MOTOR AGE would cost about twice as much or more at distant points than it does in the parcel post zone centering in Chicago.

The congress also went on record as opposed to the Sherman law, which Commissioner William M. Webster of the National Association of Automobile Accessory Jobbers stated is entirely out of date and does not effect the reforms which were in the minds of the men who enacted it.

A telegram was sent to President Wilson expressing confidence in him and tendering him the support of the congress. He replied with appreciation of the sentiment expressed. President Wilson is closely allied with the salesmanship movement in that he opened the first meeting of the congress ever held, two years ago in Detroit.

BUREAU TESTS GLASS TYPES

Washington, April 26—The Bureau of Standards has been testing two types of non-shatterable glass intended to protect the eyes from splinters when accidents break the glass in spectacles, aviators' goggles, face masks, windshields, etc. Type A has one side covered with a layer of celluloid, while Type B has a layer of celluloid sandwiched between two layers of glass.

Comparative values of the dynamic strength and shatterability of the glasses were obtained by subjecting them to sudden shock or impact, either by dropping a steel ball on the glasses or by shooting a bullet at them. The data on Type B, said to be the glass known as Resistal, made by Straus & Burgeleisen, New York, says that when subjected to the dropping steel ball test in general it lost no splinters from the rear side until the front was completely shattered and the steel ball struck the intervening layer of celluloid.

When a 30-caliber bullet was fired at the glass from a distance of 25 yd. with a muzzle velocity of 2700 ft. per second it made a clean-cut hole and produced numerous irregular cracks in each of the sheets of glass separated by the celluloid. These cracks were confined to a circular area of about 2 in. radius, and the remainder of the 4 by 10-in. plate was firmly held against rubber strips on a target. All the glass except a small area immediately around the bullet hole was held firmly by the celluloid.

TO EXHIBIT WAR DEVICES

Dayton, Ohio, April 26—Demonstrations of automotive apparatus for war use specially and popular papers dealing with new designs of automotive apparatus for the war constitute the program for the summer meeting of the Society of Automotive Engineers which will be held here June 17-18. The meeting will be held in Triangle Park, 400 acres, in the immediate vicinity of McCook Field, which is under the direction of Major Howard Marmon. Sessions will be held in the pavilion, and the society will have the exclusive use of the park.

Demonstrations will be made of aviation engines, among them all the German types and French and British engines.

The annual summer dinner will be held the evening of June 17, in the pavilion park. Accomodations for 1,000 or more will be available. Tickets at $3 each are now on sale at the New York S.A.E. headquarters. Hotel accomodations will be handled directly by Dayton's hotels and a special Dayton S.A.E. committee. It is hoped it can be arranged to accommodate more than 1,000 members and their guests. The daily sessions will be held commencing at 10 o'clock, until completion at night at Triangle Park. Luncheons will be served there, and ample garage facilities are available.

"HISTORY OF STUDEBAKER"

The story of Studebaker from the days when the Studebakers started the manufacture of their sturdy wagons to now when the motor car and delivery wagon are big features of its business is presented in a 97-page book signed by A. E. Erskine, president, and entitled "History of the Studebaker Corp." The make-up of the book is very presentable, and in addition the facts in regard to the founders of the organization and the growth since are of interest to many who knew first the Studebaker wagon, then the Studebaker E. M. F. and finally the Studebaker car. The book is written, as the preface explains, "for the information of the 3000 stockholders of the Studebaker Corp., the 12,000 dealers in its products living throughout the world, its 15,000 employees and numberless friends." A resume of the present financial status of the corporation is included. The book is to be mailed to Studebaker dealers and others who request it.

S. A. E. HEAD AT JOINT MEETING

Chicago, April 27—The future internal combustion engine will be incased in an asbestos jacket, much like the steam engine is; better thermal efficiency will be realized by placing a by-pass in the water outlet operated in conjunction with the throttle lever—these were the high-lights in a talk to the joint-meeting of the American Institute of Electrical Engineers, the American Society of Mechanical Engineers and the Western Society of Engineers by C. F. Kettering, president of the Society of Automotive Engineers, here this week. Mr. Kettering's subject was "The Automobile Powerplant."

The speaker outlined the principles of operation of the internal combustion engine and exploded several theories, among them the pre-ignition knock theory. The latter knock, he said, was not due to red hot particles in the combustion space but rather to the presence of carbon, which by nature is an excellent insulator to prevent the waterjackets from giving back to the cylinder walls the necessary heat particles. Thus the engine operates in much the same manner as when cold, producing a knock. He took up the subject of carburetion and touched briefly on kerosene. Mr. Kettering drove home his statements by blackboard illustrations. Before closing the speaker gave a short history of the developments that led to the design of the Liberty aviation engine and mentioned also some of the features of European designs.

Special Tractor Engines

Needed to Take Care of Peculiar Problems in Use of Kerosene Fuel

Progress in Design Discussed Briefly in Paper

CHICAGO, April 27—Need of special engine design to take care of the peculiar problems involved in the use of kerosene as a fuel for tractors and the possibility of a return to make-and-break ignition for slow-speed tractor engines were the main features brought out in the technical session of the Mid-West section of the Society of Automotive Engineers last night. "Magneto ignition for Ford tractors" was the title of the paper presented by J. G. Zimmerman, service engineer of the Sumter Electrical Co. This was illustrated by special slides showing oscillographs of the building-up of current voltage and power in spark gaps of different lengths and sparks produced by different ignition devices. H. T. Sward, sales engineer of Fairbanks, Morse & Co., presented a paper on "the Oil-Burning Tractor Engine," in which he described in particular the engine used in the Fair-Mor tractor.

Officers were elected as follows: Chairman, G. W. Smith, assistant chief engineer, Nash Motors Co., Kenosha, Wis.; treasurer, Lon R. Smith, sales engineer, Buda Co., Harvey, Ill.; secretary, Darwin S. Hatch, editor MOTOR AGE, Chicago; C. S. Whitney, past chairman, automatically becomes vice-chairman and George L. Lavery, as past treasurer, is the fifth member of the executive board. Mr. Sward's paper follows:

The Oil-Burning Tractor Engine

THE construction history of the farm tractor extends back into the early '70's, but it remained for the twentieth century to see the dawn of the tractor driven by the gas and oil engine.

While the gas and oil tractor has been in the field of operation for about fifteen years, this period apparently has not been long enough for designers and engineers to gather conclusive evidence indicating definitely the type of engine best adapted for this purpose. There is being used to-day almost every type of internal combustion engine, from the low-speed, hopper-cooled farm type of stationary engine to the high-speed automobile engine.

With each of these types it is necessary for the designer to use radically different construction in the general design of the tractor, in transmission, etc., and as a result it has been difficult for any association to gather sufficient data to develop an engine that can be called a standard tractor engine.

This one fact, more perhaps than any other, has made it necessary for the purchaser of a tractor to have some knowledge of the product he is buying. It has been necessary for him to study carefully the various designs so as not to be the prey of overzealous salesmen. This condition has had a great deal to do with the indifference on the part of the purchaser toward the use of tractors driven by internal combustion engines.

In the design of a tractor engine it should be borne in mind that the average user is going to consider seriously the small tractor. In other words, he will buy a tractor with an engine which he thinks is large enough, and the tendency has been to buy the outfit which is rated at the highest power and the lower price. The result of this condition has been that the tractor engine usually is loaded to its full rated capacity. It is required to develop its full load or better most of the time in regular service. It is, therefore, necessary to furnish an engine designed to carry this load without undue strain upon any part.

It is a well known fact that the automobile or truck engine rarely is required to carry its full load; and on this basis these engines are so designed that if obliged to carry their full load ratings continuously they require most careful attention and adjustment. It has been found in stationary practice that an engine designed to stand up under all load conditions, and especially where full loads are required for any length of time, must be a slow-speed engine to show the greatest reliability.

Early in the history of the stationary engine several high-speed engines were developed, but all these were proved unsatisfactory for continuous heavy work. High speed necessitated the use of light reciprocating parts, and it was found practically impossible to build them heavy enough to stand the continuous heavy strains and give good service.

Further, a tractor engine to be successful must be one that when placed in the hands of a man of average intelligence can be operated without unusual difficulties. Also it must be economical in operation. It should be a constant-speed engine with as few parts as possible and free from intricate and delicate mechanism.

Problem of Engine

The designer of tractor engines is confronted, perhaps more than any other, with the problem of an engine that will operate successfully on cheap, low-grade oils. This subject has been studied by the majority of tractor manufacturers during the last years, and in some cases it has been treated as a matter of secondary importance. Many attempts have been made to convert an engine designed for gasoline to operate on oil by the simple addition of a manifold and a specially constructed carbureter, with which application they have called and advertised the engine as a gasoline-kerosene engine.

About ten years ago the first solar oil engine was introduced in stationary units. This engine was not an oil engine but practically a dry-gas engine to which was attached a large cumbersome carbureter or vaporizer. This was nothing more or less than a refining retort in which the lighter distillates were released in the form of gas and the heavy ends and residue precipitated. Several attempts were made to operate engines along the lines of our present automobile engines, provided with splash lubrication on the heavier oils, but these were absolute failures. All these failures can be attributed directly to the improper handling of the fuel and the failure of the lubricating system.

Progress has been made very rapidly in the oil engine field, until it can be stated that more than 90 per cent of the engines larger than 5 hp. manufactured to-day for farm and industrial purposes are equipped to burn kerosene and distillates as low as 38 deg. Beaumé. To do this it has been necessary to discard many well-designed engines and many practices that were considered standard. This must also happen in the automobile-type engine before real progress can be made in the oil-burning engine for general automotive purposes.

Gasoline engines fitted with kerosene carbureters are not successful, as they are simply an addition of delicate parts, which

parts are supposed to accomplish the necessary volatilization of the fuel and take care of all the functions of the oil-burning engine. Experience has taught us that this cannot be done by a carbureter, as the engine must be designed to take care of this heavy fuel not only in the carbureter but during all stages until power has been developed.

As we have no choice as to the fuel to be used, the designer should consider carefully how the low-grade fuels can be put to use without the resulting difficulties which the kerosene carbureter presents. The engine which we have used successfully is of the horizontal, two-cylinder, four-cycle type, with compression carried at about 60 lb. The cylinders are cast in block with a common crankcase, the connecting rod having a single throw, giving the crankshaft a power impulse at every revolution. The fuel-mixing chamber consists of a very simple casting, in which the fuel is kept at a uniform level by an overflow pipe, which returns the excess fuel delivered by a fuel pump to the fuel tank in the base of the engine or tractor frame.

In starting the engine, all the fuel is returned to the fuel tank and the mixing-chamber reservoir, as well as the fuel pipe above the pump, filled with gasoline. This amount of fuel enables the engine to be started readily and operated until warm enough to operate on the heavy fuels, and the change is made automatically as the kerosene and gasoline are pumped into the mixing chamber after the engine is in operation.

The hot-air intake is taken through a manifold on the exhaust pipe, passing through the mixing-chamber reservoir, passing over the needle valve in the usual manner. Between the mixing chamber and the cylinder head is an auxiliary air intake, in which is provided an auxiliary valve controlled by a spiral spring. In this cold-air inlet below the valve is the water spray nozzle in which the water is kept at a uniform level by an adjacent float chamber. As the load comes on the engine the governor opens the fuel throttle valve, and this action increases the volume of air to a point where the regular air intake cannot supply the air, and the auxiliary valve is opened automatically to supply the required amount of air for combustion. The opening of this auxiliary valve, also automatically, controls the amount of water taken into the cylinder in direct proportion to the load upon the engine, giving a uniform and satisfactory operation at all times.

Mixing Chamber

In an oil engine it is of utmost importance that the mixing chamber be immediately adjacent to the cylinders and the passages from the chamber to the cylinders be equidistant. In this engine the chamber is located immediately adjacent to the cylinder head with the inlet valves to both cylinders directly beyond the throttle valve. All valves are in the heads of the cylinders, the exhaust valves on the outside of each cylinder, the head being a single casting for both. This gives a minimum distance for the passage of gases and insures against condensation due to long conducting pipes to the inlet valves. Also the circulation is restricted at the points around the inlet valves and passages to insure a higher temperature of the water at this point.

Experience has shown conclusively that the splash system of lubrication cannot be used with heavy oils such as kerosene and distillates, etc., even with the best of construction. In the present condition of the fuel market, the gasoline which is obtainable requires the renewal of the crankcase oil at least every 1000 miles to insure against burnt-out bearings and kindred troubles. Time is not distant when for economy as well as satisfactory operation this system must be abandoned and the force-feed lubrication to all bearings used universally.

The tractor engine should be lubricated by the force-feed system to insure proper lubrication of all parts, and I believe it is used almost universally, except where motor car engines are used.

The cooling of the engine is a novelty but nevertheless has proved itself to be among the best systems used. The main frame of the tractor looks much like a steam boiler. This is a large radiator, with tubes, through which the air is drawn in quantity directly proportionate to the load on the engine.

The exhaust from the engine is piped to the chamber in front of the radiator, and in making the discharge through the muffler shaped like the smoke stack it creates a draft through the radiator which keeps the water at a uniform temperature. Circulation is maintained by a circulating pump driven by the belt from the engine flywheel.

Electrical ignition, of course, is used, and in this particular engine, the high-tension system is used.

The Sumter-Dixie clutch type magneto is used, with suitable timing arrangements. This has been found to be very successful, as it makes it possible for the purchaser to secure repairs readily at all times in cases of troubles without being obliged to await repairs from some distant factory.

Labor Worries Detroit

Shortage Is Expected to Reach 35,000 in Next Six Months

Government to Help Makers Meet Situation

DETROIT, April 27—The labor problem in Detroit is one of great magnitude. From a present shortage of 20,000 men it is expected this will grow to one of 35,000 within the next six months. Because of the great demand for labor the local manufacturers have been obliged to advertise in the liner section of the daily papers. Instead of this helping the situation it has become worse. The men knowing they can always get work elsewhere are influenced by this advertising to leave their present places and seek other ones where they think they can get more money.

This has prompted a visit by a representative from the Detroit board of commerce to Washington to place the matter before Government officials. While there it was also intended that he get an angle on the reason for large contracts for local companies being held up.

Despite the many plants that are busy almost to capacity on war orders there are many smaller ones that have facilities for handling much of this work. The representative also took this up with the Government officials. As a result of this visit, the Government will send representatives here from Washington to analyze the labor situation and the facilities of the various actories for handling more work with the idea of supplying them with orders.

The Government will establish a Federal employment bureau in Detroit, according to a statement made by Charles T. Clayton, assistant director of the United States employment service, Department of Labor. This bureau will endeavor to line up all skilled workmen in Detroit and make certain that they are employed where their services are of most value. The bureau also will prevent serious shortage of skilled labor in the munition plants of Detroit if the manufacturers themselves will co-operate. When the bureau is established manufacturers will be urged by the Government to get in immediate touch with it so that they may be assured adequate labor supply. Should any skilled workmen be drafted, the Government desires manufacturers who need them to put in exemption claims and follow them through.

Arrangements now are under way to have Government contracts in this locality handled by the district ordnance division. Whenever the Government has contracts to award, if it is known in Washington that this territory has facilities for handling it, the matter will be sent to this district to be taken care of, either apportioning the order to several smaller companies or giving one company the entire contract, this will be left to the discretion of the local district. On competitive contracts, however, the matter will be handled as heretofore, in Washington, except that this district, the same as others, will have an opportunity to present its bid.

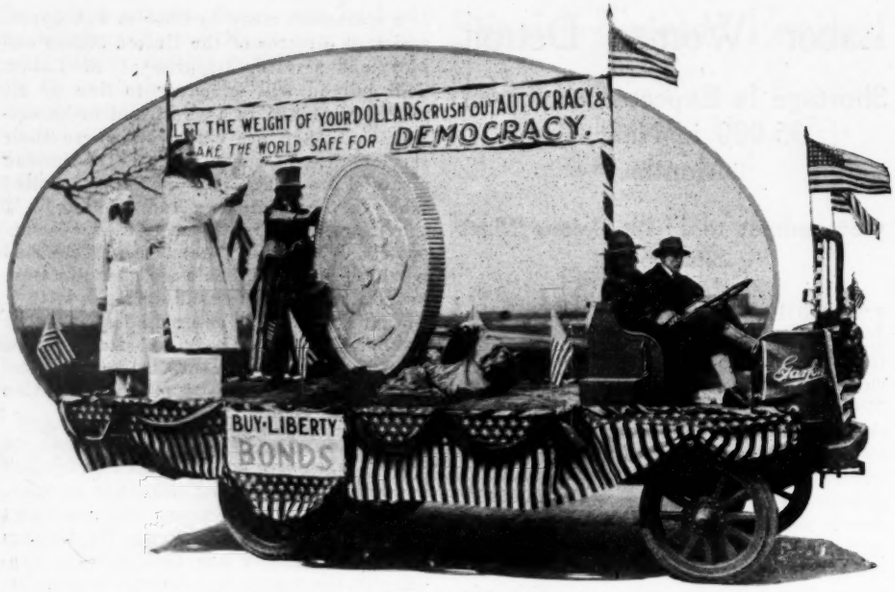
M. & A. M. REFUSES SANCTION

Chicago, April 30—Uncertainty among the trade as to the stand the Motor and Accessories Manufacurers' Association will take regarding the two fall accessory shows scheduled for Chicago seems to be cleared up by a letter sent out to its members stating it will not sanction the proposed exhibition of the National Association of Automobile Accessory Jobbers but takes jurisdiction over it. This may be interpreted to mean that members of the M. & A. M. who exhibit at the N. A. A. J. show may get into trouble with the M. & A. M. Commissioner Webster of the N. A. A. J. says they did not ask for sanction and has application for space from members of the M. & A. M.

The N. A. A. J. show, which is to be held at the Municipal Pier, was refused a sanction as well, but there was no statement from the M. & A. M. that would pre-suppose action by that organization against its members who exhibit. This exhibition seems to have the hearty support of the city and of the Association of Commerce.

HIGHER GASOLINE PRODUCTION

Washington, April 30—Special telegram—Production of gasoline during 1917 was 67,831,437 gal. more than in 1916, the total production during 1917 being 2,729,712,033 gal. The average daily production throughout 1916 was 5,625,357 gal., as against 7,478,663 in 1917, an average daily increase of 1,853,306. Stocks of gasoline on hand Dec. 31, amounted to 412,256,833 against 287,758,562 on hand Sept. 30. In other words available stocks of gasoline increased 124,098,271 gal. during the last three months of the year. These figures have been made public by the Bureau of Mines.



One of the floats sponsored by Garford in the parade at Lima

Clubs Back Liberty Campaign

MOTORING organizations throughout the country has proved very effective means of increasing Liberty Bond sales. Their efforts have been directed not only to the actual sale of bonds among their own members and employees along the lines suggested by MOTOR AGE. As motorists, members of these organizations in nearly every city have supplied the chief means of transportation for Liberty Loan speakers and salesmen.

The motor club offered the logical central organization for supplying motor transportation to the Four-minute men and subscription agents for the loan, and advantage has been taken of this in nearly every city in the country. In very few places have the motor clubs conducted a campaign independent from that of any other organization. Nearly always their efforts have been affiliated with the Liberty Loan Campaign organization of the city and in this way the motorists have scored.

In practically every city the motoring organization distributed windshield stickers boosting the loan, and the members in general proved their willingness to help by carrying these.

A Few Instances

MOTOR AGE is in receipt of reports of club activities from scores of different cities, and in practically every one these organizations are working effectively with the local committee of the Liberty Loan. To mention a few specific instances of this co-operation will show what the clubs as a whole are doing. The Lincoln Automobile Club of Lincoln, Neb., has contributed the services of its members and their motor cars to the extent of fifty cars a week during the campaign, taking speakers and singers to the various schoolhouses and churches in the county. The Wilkes-Barre Automobile Club members have contributed their cars and their services as drivers for the use of the speakers' committee of the Liberty Loan Campaign and the distribution of posters, etc. In addition, many of the club members are on the speaking committee.

The Akron Automobile Club furnished most of the transportation for speakers, etc., in connection with the campaign in Summit County, Ohio. This is a very considerable task in an industrial city where every business man is working to the limit trying to keep the world supplied with tires and other rubber products. In previous campaigns the club was organized very similarly to the methods outlined in MOTOR AGE and obtained splendid results.

In Munsey, Ind., the Delaware County Motor Club handled the entire transportation work for the campaign, supplying cars and speakers for all special events incidental thereto.

Credit for the success of the Third Liberty Loan drive in Columbus, Ohio, is given to the motor trade in conjunction with the Columbus Automobile Club. The members of the club were prominent in the work of the Liberty Loan committee

CHICAGO AUTOMOBILE CLUB
581 PLYMOUTH COURT
CHICAGO

April 13, 1918.

Fellow Club Members:-

How much would an insurance policy be worth that would guarantee that your family would not be violated and murdered, your home burned down, your property destroyed and your opportunity to make a living taken away from you?

How much do you suppose the head of a family in Belgium would have given four years ago for such insurance? How much would it have been worth to him?

You can get that insurance RIGHT NOW and the Government will pay you interest on the money that you advance them and pay that money back to you besides.

Will you not fill out the enclosed subscription blank and send back to the Club at once? We would like the C. A. C. to be 100% on subscriptions. Even though you may have subscribed elsewhere send a subscription through the Club, accompanied by a check for 5% of the amount and have the balance payable through your own bank.

There is a Club Booth for subscriptions on the second floor of the Club for your convenience.

HELP WIN THE WAR

Very truly yours,

Liberty Loan Committee C.A.C.
W. CARY LEWIS,
J. J. BARCLAY,
J. T. BROWN,
D. E. WHIPPLE,
R. O. EVANS.
Chairman.

Letter used by Chicago Automobile Club

Enlist or

and the clubmen's cars formed one of the chief transportation methods for the sales force. Work of canvassing members of organizations in Cleveland was carried on by the Cleveland Automobile Club, which also formed a permanent house-to-house canvass organization. This same organization will be used for later Liberty Loan campaigns as well as those of the Red Cross, Y. M. C. A. and other movements.

The Automobile Club of Western Washington at Tacoma bought $4,000 worth of bonds as a club before the campaign was a week old.

A special campaign for Liberty Loan subscriptions was put on by the Chicago Automobile Club in addition to its activities in connection with the centralized campaign of the city. In its own drive the club appointed a committee of five which solicited personally every member that could be reached and also got out a letter to its entire membership. This letter is reproduced herewith and is one of the best arguments for bond subscriptions that has been developed. The club also maintained a special Liberty Loan booth at its clubhouse, where subscriptions were received at all times, and the results were such that more subscriptions were taken in within the first three days than were received by any of the leading hotels or department stores. C. A. C. members likewise supplied cars for the committee in charge of the general campaign and to this end sent out a special notice to its membership asking for volunteers. Members were asked to set aside a few hours or an entire day if possible, when their car with themselves or a driver would be available for the use of the campaign committee.

The use of its road-marking signs for boosting the bond campaign was the unusual method used by the Chicago Motor Club. This spring that organization signboarded new routes and re-signboarded several old ones within a radius of 100 miles of the city, and each of these road signs carried the word, "Buy Liberty Bonds." This effort not only has a temporary effect but will be a permanent solicitation for future Liberty Loans drives. In addition to this, the club organized a booster committee of 766 members, which, together with the sixty-six club commissioners, who reside in towns and cities adjacent to Chicago, is used in the Liberty Loan campaign as well as forming a permanent organization for future campaigns.

DENVER OVER THE TOP

Denver, Col., April 27—Out of a total of $10,095,800 subscribed to the Third Liberty Loan in Denver, $217,350 was brought in by the Liberty Loan Committee of the Denver Automobile Trade Association.

Among the nearly 2000 workers in the city during the campaign were hundreds of Denver Motor Club members and also many prominent motor tradesmen outside of the association's committee. While there has not been made any itemized classification covering the amounts pledged by the several separate lines of business

Invest

represented by the 56,367 Denver buyers of Liberty bonds, there is a general indication of substantial response among all branches of the motor car industry. Similar reports come from other parts of the state. In Colorado Springs, for example, practically every member of the Automobile Club and the Automobile Trades Association has been active.

Both Denver individually, and Colorado as a whole, have brought their subscriptions well beyond their quotas.

INTERNATIONAL DOES THIS

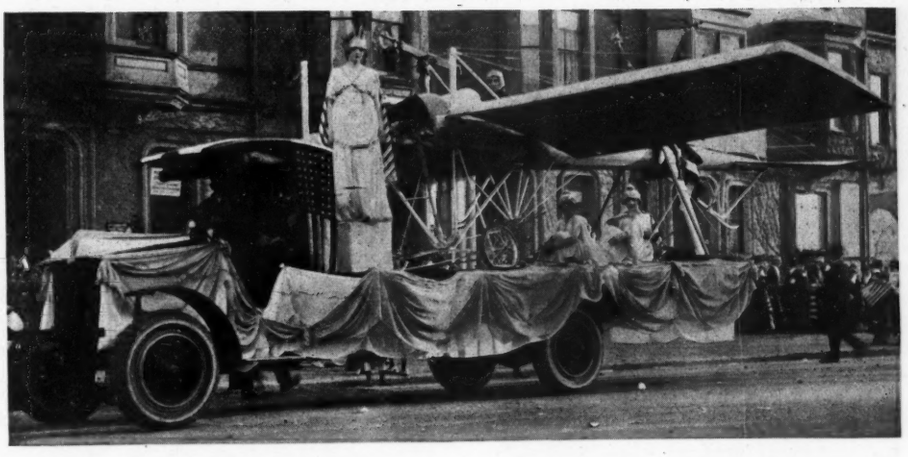
New York, April 27—More than $125,000 has been subscribed by employees of the International Motor Co. to the Third Liberty Loan so far. The company permits the workers to take out bonds in denominations of from $50 to $500, paying 10 per cent a month. If the worker leaves before the account is paid he can either pay the difference in full or the company will take the bond from him, paying back the amount already received. When the last 10 per cent comes due, if the employee is still with the company, International presents him with the bond without the last payment, that is, all employees can get a $100 bond for $90.

CHICAGO PILES UP SCORE

Chicago, April 30—Although the city as a whole is behind schedule on Liberty Loan sales, the motor industry is making a good showing. Practically all dealers have reported sales. Two hundred and forty concerns have 100 per cent subscriptions or better. Subscriptions over 100 per cent mean that not only every one of the employees have bought bonds but that bonds have been sold also to outsiders. The Zinke Co. heads the list with 300 per cent. Twenty-two manufacturers have showings of 100 per cent or better. Among these are: Stewart-Warner Speedometer Corp., Vesta Accumulator Co., International Harvester Co., Elgin Motor Car Corp., Van Sicklen Co., Twin Tube & Rubber, G. P. Coal Oil System, Fowler Lamp & Mfg. Co., Commercial Truckmobile Co., Van Cleef Brothers, Kero-Karburetor Co., Hill Pump Valve Co., Johnson Automobile Lock Co., and Buell Mfg. Co. Other concerns, such as Stromberg Motor Devices, Findeisen & Kropf, Diamond T Motor Car Co., Parrett Tractor Co., and Perry Auto Lock Co. are well up in percentage. Stewart-Warner has subscribed $201,400 and International Harvester has subscribed $4,000,000. All but 500 of the 21,400 employes of the Chicago works have subscribed. Parrett Tractor Co. has subscribed $14,750 and has a 95 per cent subscription. Findeisen & Kropf have $21,850.

REGAL BUSINESS TO BE SOLD

Detroit, April 27—As a result of a meeting of the larger creditors of the Regal Motor Car Co. it was recommended that the receiver sell the business at public auction the latter part of June. The service business will be continued in the meantime and will be sold as a going business.



U. S. Tire Co. float in Boston parade, mounted on Pierce-Arrow truck

Trade Boosts Sale of Liberty Bonds

THE motor trade throughout the country has responded nobly to the opportunity presented to use its organization in different centers and its salesmanship in selling Liberty Bonds. In most of the larger cities the local motor trade association has been made the organization through which dealers, garages, etc., were approached and in practically every instance has gone over the top in a hurry. In Chicago, the Chicago Automobile Trade Association was put in charge of the division which covered that field, as has been told before in MOTOR AGE, with the president of the association as the head of the division.

In Columbus, Ohio, the manager of the Columbus Cadillac Co. was made chairman of the sales force of all committees of the loan, having charge of a force which numbered in the thousands. In Portland, Ore., the Buick distributer turned over his whole organization to pushing the Liberty loan, working every house in his district. During the first week Oregon dealers subscribed $200,000.

In San Francisco dealers on the Liberty Loan committee send out their best salesmen in pairs to work the motor trade exclusively. When a hard subject is found the matter is referred to the committee chief, who takes him in hand personally. If after every effort has been used on a man and the committee is certain he is able to subscribe and no clearly legitimate excuse is offered, a large, yellow envelope with the word DISLOYAL, printed in bold type upon it is shown him and his index card placed within. It is a drastic plan that generally works.

The members of the committee get down to their offices several hours early to clear up what business they can before 10 o'clock and devote the rest of the day to Liberty Loan propaganda. Employees of Earl C. Anthony, Inc., Packard dealer, went over the top within the first week.

In St. Louis and Chicago the advertising for the Third Liberty Loan is being done by space donated by various firms in the city, among whom the motor trade figures prominently.

The campaign was featured in many cities by one or more parades, and in all of these the motoring organizations and the motor trade figured. In Hartford, Conn., the drive began on the closing day of the annual motor car show. The Automobile Club of Hartford had a booth at the show where Liberty Loan literature was passed out during the week, and the motor trades association had a Liberty Bond sale booth at the show. A motor car parade held during the week was the work of the motor club and motor trade of the city.

Parade at Lima

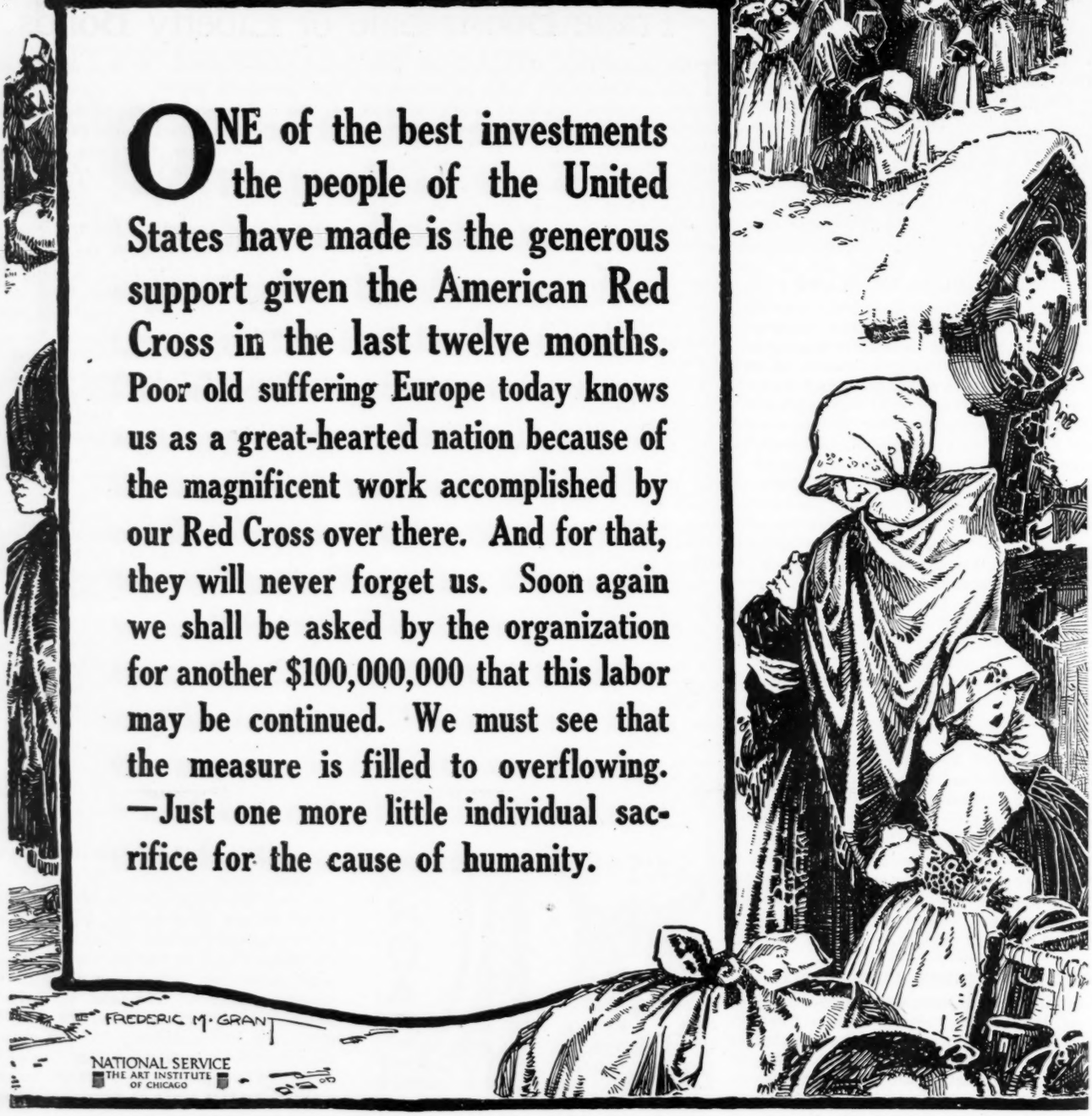
In the parade which featured the campaign in Lima, Ohio, six Garford motor trucks carried specially arranged floats which were particularly attractive. The Pennsylvania Rubber Co. has tendered to and had accepted by President Wilson for use in connection with the campaign its $30,000 talking electric sign on Columbus Circle, New York.

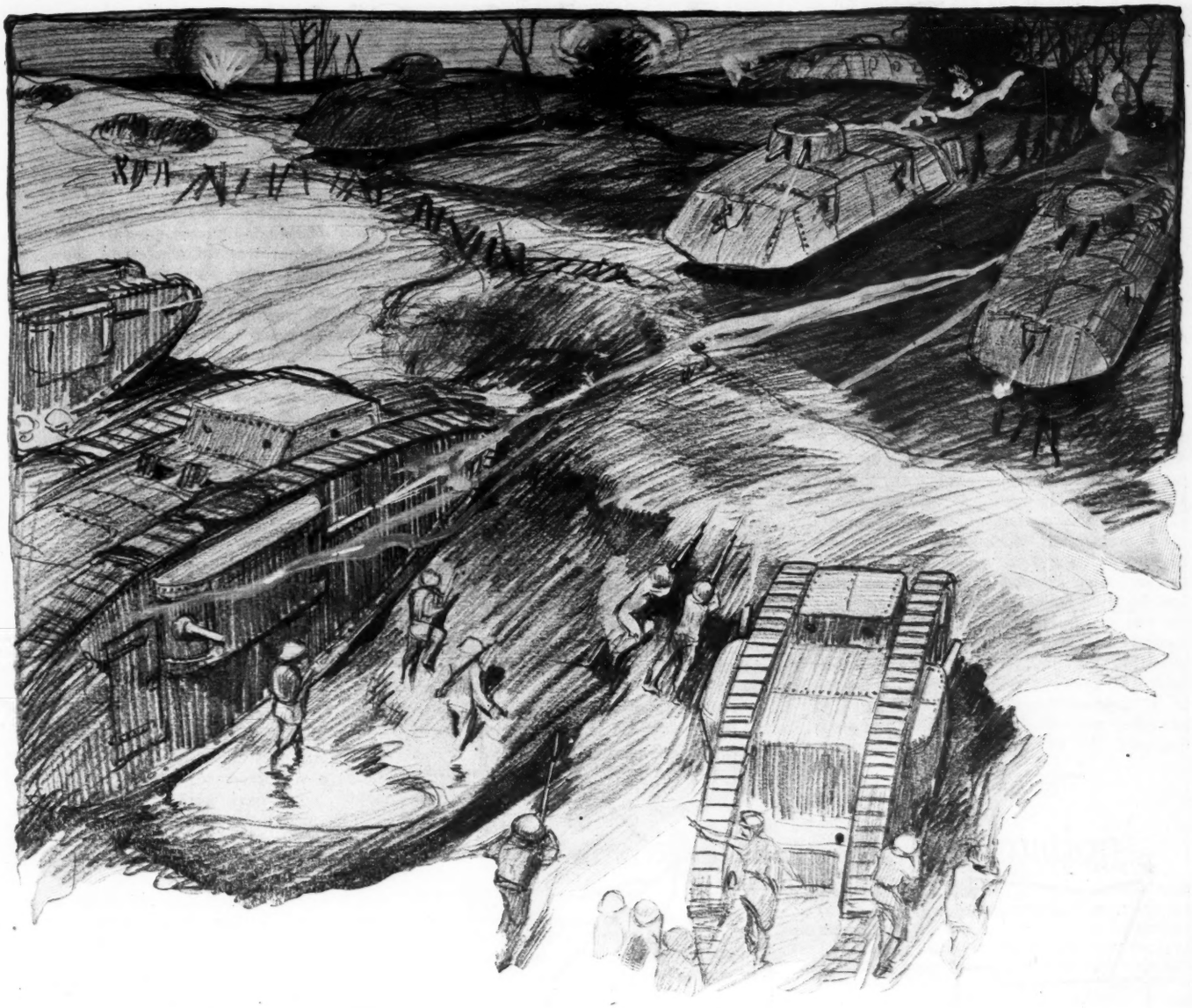
Signboards of Chicago Motor Club

FIRESTONE 99 PER CENT

Akron, Ohio, April 27—As a result of a one-week campaign for the Third Liberty Loan, 99 per cent of the Firestone employees subscribed, and it is expected that the factory will be 100 per cent a Liberty bond subscriber before the close of the campaign May 4. The total subscription was $562,500. In fifty-one of the sixty departments of the factory 100 per cent of the employees subscribed. A committee of 130 was formed at the start of the campaign and plans made to finance the buyer on the installment plan.

ONE of the best investments the people of the United States have made is the generous support given the American Red Cross in the last twelve months. Poor old suffering Europe today knows us as a great-hearted nation because of the magnificent work accomplished by our Red Cross over there. And for that, they will never forget us. Soon again we shall be asked by the organization for another $100,000,000 that this labor may be continued. We must see that the measure is filled to overflowing. —Just one more little individual sacrifice for the cause of humanity.





Tank Meets Tank

FOR the first time in history land battleships of opposing armies came to grips in the recent drive of the Germans against the Allies on the Western front. In some of the operations near Cachy and Villers-Bretonneux German tanks, which made their first appearance a few weeks ago, as reported in MOTOR AGE, met the British tanks and gave the world an idea of what warfare of the future must be. According to the newspaper reports, only one clash occurred between British and German tanks. Four of the German machines met three British land battleships. They came forward with the second attack. The clash occurred between them and the British tanks when the quartet came up against one big British machine and two smaller ones. Both of the latter had been damaged somewhat by the heavy cannonade, but the bigger British machine forced the enemy to retreat and put one of their number out of action.

The crew of this German tank fled, as did that of another which afterward got stuck in the mud. Neither tank, however, was completely smashed, and the enemy got them away later. Both the damaged British tanks were saved.

The new German tank is about 36 ft. long, 12 ft. high and 12 ft. wide. There is a central turret on the top and the turret guns are about 5.5 cm. These tanks also carry six machine guns, which fire from the front, rear and flanks. The whole machine has the appearance of a turtle or an inverted basin. The speed of these machines across country is said to be very slow but is much faster on the highway. One tank last Wednesday had the name "Cyclop" painted across the front, and another bore a skull and cross bones.

The slaughter caused by the small British tanks among a concentration of the enemy near Cachy in Wednesday's fighting appears to have been greater than originally was reported.

A few of these little engines, which are much faster than the ordinary big tanks, made the assault so quickly on two or three battalions of the enemy's infantry which were forming for an attack that the Germans were unable to scatter before they were being fiercely deluged with machine gun bullets. Not only that, but many men were caught beneath the tanks and ground into the earth. Prisoners estimate that at least two, and probably three, German companies were wiped out in a few minutes.

Only four German tanks were in action Wednesday at Villers-Bretonneux. The Fourth guards division, which advanced against the town from the south, expected seven tanks to accompany them, but three of them did not appear. The German division attacking Cachy was told that four tanks were to support the assault, but these were missing at the appointed hour. The German prisoners state they never had seen the tanks before, although they had often heard of them.

Return Loads in Ohio

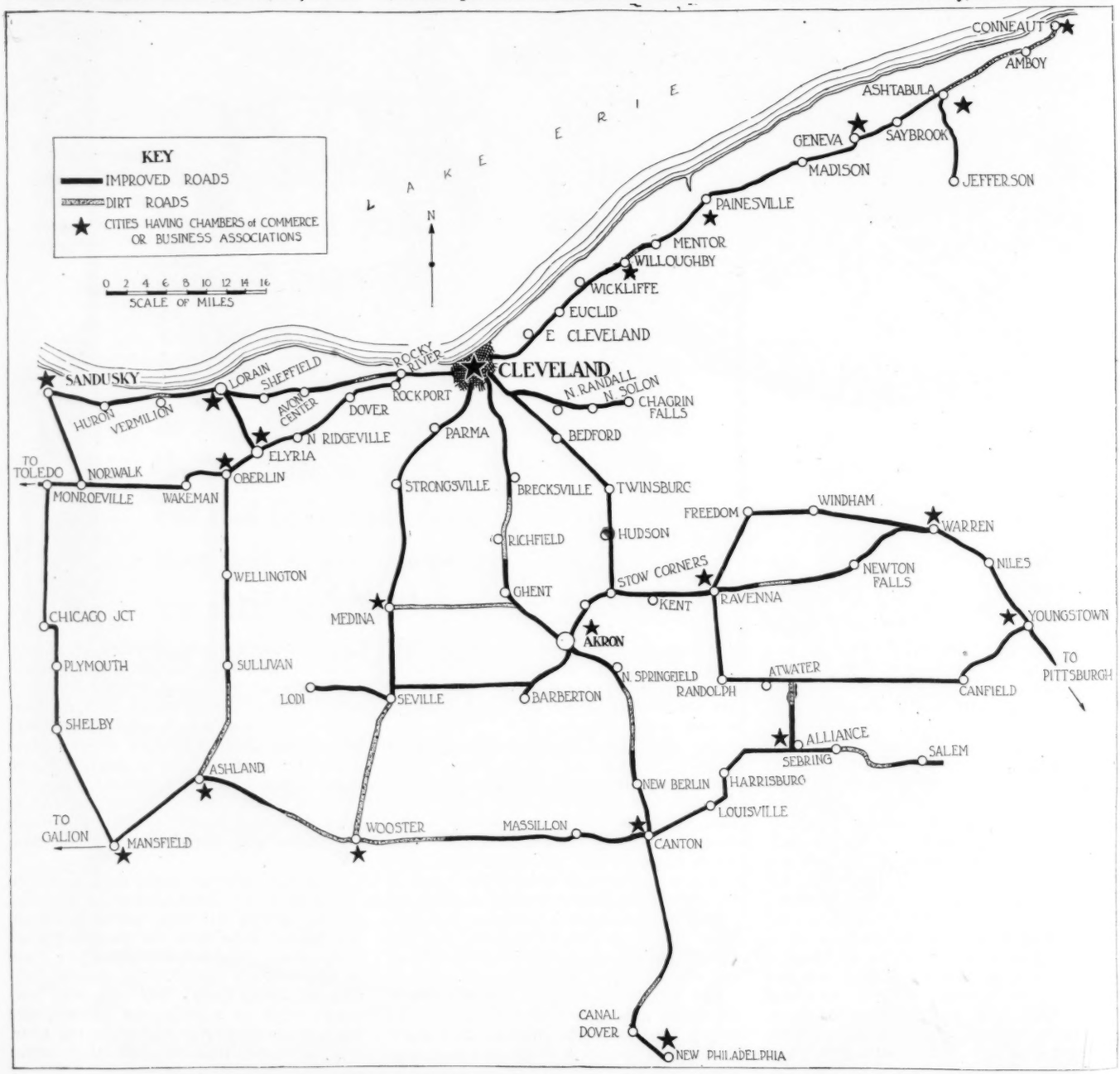
Possibilities of Development of New Inter-City Trucking System in State and How It Can Be Done

THERE is no question but that Ohio should have a state-wide return loads bureau organization. Cleveland, Akron, Canton, Youngstown, Lorain, Sandusky and Elyria are large centers which were more or less tied up as a result of the acute railroad congestion during the past winter, and between which several motor-truck haulage companies are operating.

While it is necessary that the organization must have some central head to co-ordinate the efforts of the various chambers of commerce, and while it is possible that the Columbus chamber of commerce should direct the work, since it is one of the win-the-war activities of the Ohio Council of Defense, it is certain that the great city of Cleveland should take a prominent part in the work.

In addition to introducing Return Loads Bureaus into Cleveland there are on the east Willougby, Painesville, Geneva, Ashtabula and Conneaut, all of which have chambers of commerce or business associations which could handle the Return Loads Bureau work. On the west of Cleveland there are Lorain, Elyria, Oberlin and Sandusky, which similarly have either chambers of commerce or business men's associations qualified to establish suitable Return Loads Bureaus. To the southeast of Cleveland the towns of Akron, Ravenna, Warren, Youngstown, Alliance, Canton and New Philadelphia are similarly situated. To the southwest of Cleveland those centers having either a chamber of commerce or business men's association include Medina, Worcester, Ashland and Mansfield.

Of all these centers there is not one today which has a real return loads bureau goods to be sent from one point in Ohio to another, or of the motor-trucking concerns which are capable of doing the work. As shown in the map practically all the centers are connected by some form of im-



Improved and dirt roads in Ohio and the cities which have chambers of commerce that can handle return loads work

proved roads. On the route to Conneaut the road is improved all the way from Cleveland to Ashtabula, leaving a stretch of only about 14 miles of dirt roads between Ashtabula, Amboy and Conneaut. The loop from Cleveland along the lake shore, through Lorain and Sandusky, and back to Norwalk, and through Elyria to Cleveland, has only two short stretches of unimproved roads between Rocky River and Avon Center and Vermilion. On the route to Mansfield from Elyria there is an unimproved stretch of road between Sullivan and Ashland. One other poor piece of roadway which has given considerable trouble to truck operators during the past winter is a short 2-mile stretch just outside of Atwater, on the way to Alliance. Just after the spring thaw this road was so poor that it was practically impossible to get trucks from Cleveland into Alliance by way of Ravenna, so that the longer route through Akron, New Berlin to Canton, had to be followed. Other stretches of unimproved roads in the state are shown graphically in the map.

Cleveland Truck Service

Of course, Cleveland, being the largest manufacturing center in the state, to-day has more motor trucks bringing goods into and taking them out of its confines than any other, with the possible exception of Akron, the great rubber center. An analysis recently made of the present trucks in service to and from Cleveland showed that there are approximately 100 trucks in the service at this time and that approximately 100 more trucks could be immediately transferred from their present work to haulage between Cleveland and near-by points. The same analysis showed that approximately 1500 tons of freight were being moved by motor trucks daily to and from the Cleveland district, from such points as Akron, Youngstown, Canton, Sandusky, Conneaut, Ashtabula, Alliance and Mansfield. While many of these trucks are carrying full loads in both directions, these are small in number as compared with those which carry loads only in one direction, or less than full-capacity loads both ways to maintain a scheduled service. The establishment of return loads bureaus in the various cities mentioned, which have either a chamber of commerce or business association, will make it possible to almost double the present tonnage carried without the addition of any further equipment.

This is the goal which must be reached by the return loads bureau system if the system is to prove the same success as has been the case in Connecticut. The first steps toward the formation of a state-wide return loads organization were taken March 8, when a special sub-committee of the Ohio Defense Council was formed to work out the development of motor truck transport in Ohio as a war measure. After that meeting practically nothing was done until early in April to begin the formation of a suitable organization to cover the important sections of the state. The members of the special return loads committee include D. M. Freer, traffic manager of the Cincinnati chamber of commerce, chairman; James G. Young, traffic manager of the Columbus chamber of commerce, secretary; and the following men as representatives of the chambers of commerce in their respective cities:

Sandusky, P. J. Gagen.
Springfield, C. L. Corey.
Youngstown, H. G. Rhodehouse.
Mansfield, C. S. Williams.
Canton, P. M. Seymour.
Cleveland, to be selected.
Toledo, H. J. Wilson.
Akron, W. W. Hall.
Dayton, E. M. Robinson.

J. G. Young, secretary of the committee, plans to first work out a simple return loads bureau in Columbus and to then call a meeting of the other members of the committee and the representatives of the chambers of commerce of the several cities. At this meeting it is expected that a brief outline of the method of organization and the successive steps in its formation, will be taken up in order and a duplication of the files arranged for. By some central supervision, such as, for example, that of the Columbus chamber, it will be possible to have the lists of motor truck operators and shippers written down on standardized cards, which can be kept in ordinary files in any of the offices. It is also planned for each chamber to duplicate its cards to all the other chambers of the state, so that a truck going from one center to another may be able to find out the names of the shippers in the town to which he is running who might have goods to be brought back to his home city. This would enable the driver to call one or two of the shippers by telephone before leaving on his outbound run and to secure a return load even before he started out with the truck on the first leg of his journey.

In Columbus one company operates a fleet of three trucks on three different routes radiating out of Columbus. One of these goes to Newark, the second to Delaware and Marysville and the third to Lancaster and Circleville. This overland haulage line was established early this spring, and as soon as it had prepared a schedule of rates effective April 1, 1918, C. J. Young, traffic manager of the Columbus chamber of commerce, sent out a letter to all shippers and receivers of freight in his territory who were members of the association, telling them of the establishment of the motor truck transportation line.

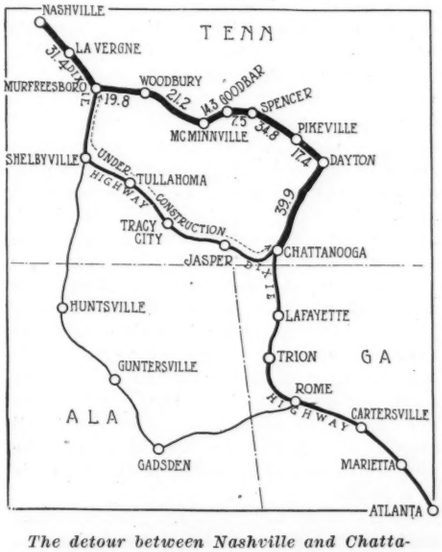
Somewhat of a similar service was performed by Mr. Rhodehouse of the Youngstown chamber of commerce for the Cleveland, Akron & Canton Tranfer Co., which is running one truck a day into Youngstown. Mr. Rhodenhouse personally investigated the standing of the C. A. C. company before recommending it to the members of his chamber. While this method of recommending the trucking concerns may be feasible in centers with only a small amount of goods to be shipped and a small number of truck operators to handle it, it is generally accepted that the successful return loads bureau should really act as a clearing house between the shipper and the truck owner leaving it to them to decide upon the price for doing the work and the responsibility for damaged goods.

Routes and Touring Information

Detroit-Pittsburgh Route

The following route is recommended from Toledo to Pittsburgh for passenger cars only as the best course for tourists who wish to drive to eastern points or to Detroit from the east:

From Toledo follow the Sunny Ridge route to Fostoria, through Pemberville and Bradner, on stone road all along the railroad to 3 miles west of Sycamore; then straight east through Sycamore and 4 miles farther east to schoolhouse on left, and turn south to the village of Lemert; here turn east to Broken Sword; from that town follow angling road southeast to Bucyrus on the Lincoln highway; from Bucyrus follow the Lincoln highway to Mansfield; there leave the highway on the road to Oliveburg; from Oliveburg, making Ashland again on the Lincoln highway, follow that route east with 7 miles of dirt road in Ashland county and 7 more in Wayne county to Osnaburg. From that point take the best route according to local advice to Minerva. One route, the Lincoln highway, extends by way of Robertsville, and the other one to the north. From Minerva follow the Lincoln highway to Lisbon; divert from the Lincoln highway at Lisbon to Calcutta, from which point there is a direct route for 5 miles into East Liverpool; from East Liverpool follow concrete road to the Ohio-Pennsylvania state line, and from that point 12 miles of dirt track to Beaver, Pa., on the Lincoln highway, from which point east the road is all good macadam.

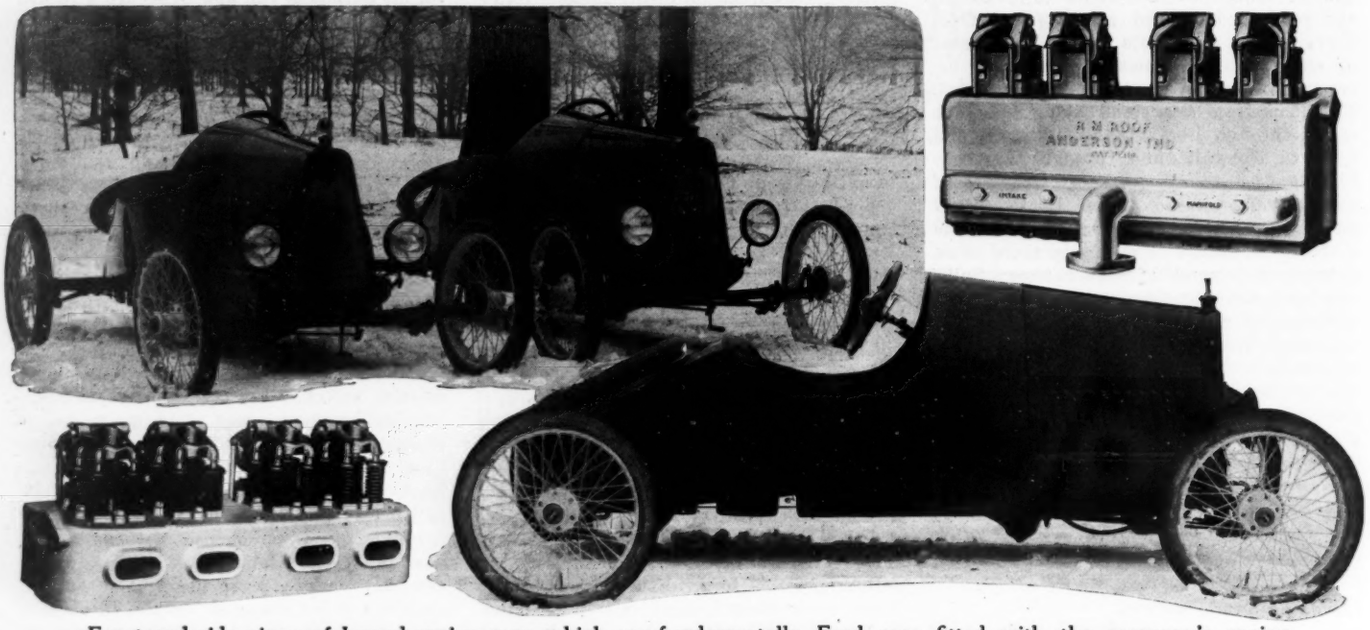


The detour between Nashville and Chattanooga is indicated by the heavy line

Dixie Highway Detour

Because of construction work on the Nashville-Chattanooga section of the Dixie highway, the Dixie association says the best and safest routing from Nashville is south via McMinnville, Spencer, Pikeville and Dayton to Chattanooga. This route is possible even after rains. The distance is 188 miles. The Huntsville-Gadsden-Rome detour, because of a very bad stretch between Huntsville and Gadsden, is not recommended now.

The accompanying map shows the location of the preferred detour to the Dixie highway and the Huntsville detour.



Front and side views of Laurel racing cars, which are fundamentally Ford cars fitted with the company's racing equipment. The other views show the arrangement of the valves and manifold for fast work

The Sixteen-Valve Ford

Application for General Passenger and Truck Work as Well as Speed

By B. M. Ikert
Motor Age Editorial Staff

AMERICAN interest in the sixteen-valve engine first was aroused several years ago when the French Peugeots made their appearance on the speedways of this country and showed a clean pair of heels to all concerned. Then in the fall of 1916 Stutz and White came out with an announcement that henceforth they would furnish cars fitted with sixteen-valve engines. As most sixteen-valve engine talk centers around race tracks many car owners have dismissed the subject as regards general passenger car and truck work, thinking that such engines are for speed work only. This is true only in the sense that they are used on racing cars, as they produce more power in a small engine, but speed is power and hill-climbing is power and while the strength of the power impulses is not so noticeable at slow high gear speed from 10 to 15 m.p.h., the faster it revolves the greater the power proportionally with sixteen-valves.

Adapted to Ford

It is now possible to adapt the sixteen-valve construction to the Ford engine, and the illustrations on these pages show how it is done. Basically the idea consists merely of removing the Ford cylinder head, valves, springs, intake and exhaust manifolds, etc., and substituting for them a head with sixteen overhead valves actuated in the Roof construction, from the regular Ford camshaft. It is a given fact that when the Ford engine is speeded up less power is developed owing to the valves not being large enough to take care of the increasing amount of gas. This is true in spite of the fact that there are more revolutions per minute of the crankshaft.

In the Roof sixteen-valve head for Fords the valves are 1¼ in. in diameter as compared to the 1½ in. diameter of the regular Ford valves. As there are two intake and two exhaust valves per cylinder, it readily will be seen that the total area of the valve opening is increased, though not quite doubled. Since the valves are also smaller there is less chance of warping, and grinding will be less frequent. The entire inside surface of the combustion chambers is machined, insuring even compression and offering less chance of carbon deposits. The spark plug on this head is located in the center of the cylinder, in the middle of each of the four valves. It is removed or replaced by a special socket wrench. When the plug is located in the center of the combustion space in this way, the flame from the plug does not have to travel so far to reach all parts of the inside of the cylinder head, and as the valve combustion space is also more compact, not having the pocket for the valve at one side, the explosion, it is said, takes place more instantaneously, giving better all-around engine performance. The slight disadvantage of locating the plug in this position is that on small throttle openings the engine does not idle quite so well, because the small amount of gas does not remain around the plug quite as closely as when the latter is in a pocket.

In the Roof head the six port openings on the right side of the Ford engine are converted into intake ports, while the exhaust is taken care of on the opposite side, the total valve area being increased about 60 per cent. This increases volumetric efficiency, as it gives the incoming charges a better chance to get into the cylinders and likewise expels the burnt charges faster. The shape of the combustion chamber becomes more spherical with this head and fuel economy is claimed because so much heat is not lost to the cylinder head as when the combustion chamber is flattened out.

The full equipment of the Roof sixteen-valve head, which is made by the Laurel Motors Corp., Anderson, Ind., includes, besides the head, fifteen cylinder-head bolts, eight 5-in. pushrods that replace the regular Ford valves in the block, four 6⅛-in. pushrods for the intakes, four 7⅛-in. rods for the exhausts, one multiple-feed intake manifold, special exhaust manifold, 5 ft. of flexible tube for connecting to muffler, copper gasket and special spark plug wrench. This is the outfit to be used on regular Ford touring cars and trucks.

The Completed Car

The company also makes a special racing outfit including 1¼-in. racing carbureter with special manifold, high-speed camshaft, light weight pistons and connecting rods, racing gears, counterbalances for crankshaft, roller bearings for front wheels and in fact, anything the owner desires to get the utmost in speed.

Herewith also is shown the completed cars built by this concern for lovers of fast cars. They are capable of making record time on mile and half-mile tracks and for general road purposes present a clean-cut roadster of graceful lines. The brass-

trimmed radiator has an unusually large capacity, and the body and hood conform to the radiator design. These cars are priced $1,500 and the construction includes the regular Ford axles and frame with underslung fittings; set of five wire wheels; 3 to 1 gears in rear axle; polished nickel sixteen-valve head; light gray iron pistons and connecting rods; worm-and-gear steering; high-tension magneto; Laurel-Van-Briggle racing carbureter, Laurel extension spark plugs; anti-leak wiring system; Laurel oiling system; Dunn counterbalances on crankshaft; high-speed camshaft; auxiliary hot-air manifold attachment, etc. A beautiful body and radiator completes this outfit.

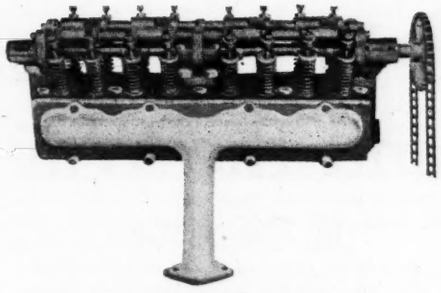
Speeds as high as 75 to 80 m.p.h. have been obtained by cars fitted with this outfit, it is said. But from this it should not be gleaned that the sixteen-valve head is solely a speed proposition, as was pointed out previously, for the sixteen-valve head with gear reduction of 8 to 1 in the rear axle makes an ideal arrangement for Ford truck units. At this gear ratio the pulling power of the Ford engine is greatly increased as well as the load which can be carried.

So far as keeping the eight intake and exhaust valves in order is concerned, it may be said this easily is accomplished by an adjustment placed on the ends of the rocker arms. This adjustment consists of a bolt with lock nut in much the same manner as on other overhead valves. Inasmuch as the rockers are in a very accessible position on top of the engine the adjustment can be made in a few minutes. On some of the earlier forms of the Roof head the rocker arms were curved and rested directly on the ends of the valve stems. Thus when the arms moved downward, they slid over the ends of the valve stems, causing friction and side thrust.

New Outfits

The new outfits are made with little pushrods 2 in. long between the stems and rockers. The ends of the pushrods are semi-spherical and seat in a corresponding ball socket in the ends of the rocker arms. This gives a universal-joint effect that practically eliminates side thrust. While noisy valve action is of little importance on cars designed for fast work, it becomes a vital factor in passenger car work. Since the overhead valves are not inclosed and have several working parts there naturally is more noise than with the conventional Ford layout. However, the fact that these overhead valves can be so easily and quickly adjusted makes it true that, on the average, they will not be any noisier than valves of the Ford type, which, owing to the difficulty of adjusting, are seldom looked after with any degree of accuracy.

The Craig-Hunt Peugeot-type racing head for Fords is strictly a speed proposition and is not recommended for touring car or truck. In this head the valves are seated at an angle of 20 deg. from the vertical and the seats are entirely surrounded by water. The valves are 1½ in. in diameter and the stock Ford valves can be used, though the makers do not recommend them, as there is danger of the heads breaking at high speeds. The overhead camshaft runs on bearings held in brackets



Intake side of the Craig-Hunt sixteen-valve head which fits the regular Ford block

in the alley between valves. The camshaft is made with eight cams of the roller-follower type. The camshaft drive is by a roller chain driven by a sprocket which replaces the regular fan belt pulley on the crankshaft. No fan is used with this equipment.

Special attention has been given to the setting of the cams to insure high speeds. Each of the eight cams operate one rocker arm of the forked type, which in turn operates two valves. The arms are fitted with an adjustment for clearance. The port area has been made slightly greater than the valve area, with compression ratio 5 to 1. The combustion chamber constitutes about 20 per cent of the cylinder volume.

Two spark plugs per cylinder are used in this head, which fire under and between the valves on each side. Reference to the sectional view will make this clear. The intake manifold is of the ram's horn type and takes 1½ or 1¼-in. carbureter. The water outlet is placed in front and connects to the radiator in the conventional way. The complete outfit includes, beside the head, manifold, bolts, camshaft chain, sprockets, gaskets, etc.

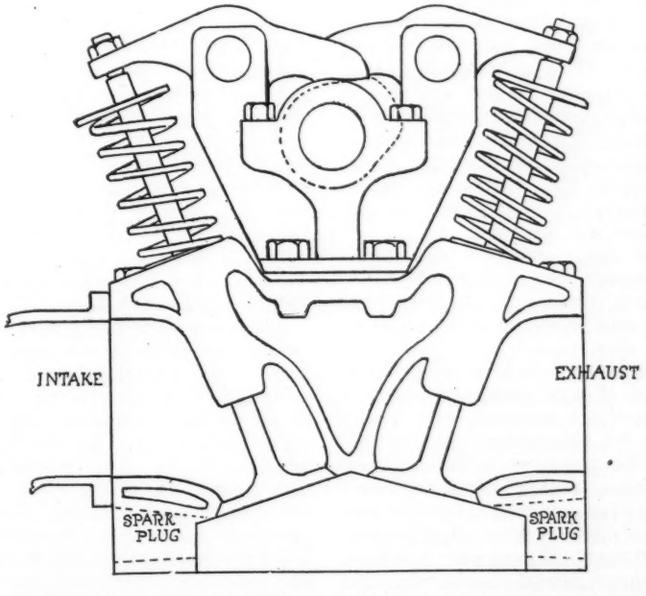
The Craig-Hunt head is made by Craig-Hunt, Inc., Indianapolis, Ind., and in addition the company makes parts to undersling the Ford frame and furnishes special racing gears, wire wheels, counterbalances for crankshaft, etc. Racing bodies are built to order, and special radiators are furnished with larger capacity than the Ford. Lightweight piston rods can be had, together with tubular or I-beam connecting rods.

MOTOR VEHICLES TO RESCUE

Detroit, April 27—In this day of the motor vehicle means of transportation do not depend entirely on electric cars as was well illustrated during the recent streetcar strike in Detroit. As soon as it was learned that the city might be without electric car transportation, that it was probable that streetcar men would walk out, steps at once were taken to arrange for truck routes throughout the city. Nearly every car manufacturer and those industries engaged on war work brought into play all the available trucks to gather up their workers. Announcements of the truck routes were placed in the daily papers and posters were placed around the factories.

Henry Ford & Son, the Lincoln Motor Co. and the Continental Motors Corp. each had space in the newspapers announcing the routes of the trucks. The Packard Motor Car Co. placed notices on the bulletin boards of its factory. Arrangements were made to pick up both the day and the night shifts. At the time these posters or notices were hung it was not known that a strike would be called, but these plans were instituted to have everything in readiness should a strike be called outside of the regular working hours of the factory.

As a result of this action, the companies were able to take care of a big percentage of their employes in the matter of transportation. No serious loss in production was felt as a result of the strike. In the case with Packard, the Army gladly lent the company many of the trucks which it built for them, and these were put into service with good results.



Sectional view of Craig-Hunt head, showing the position of the inclined valves and spark plugs on each side. The Ford camshaft is removed when using this outfit

Foreign Motor Car Trade and the War

By John N. Willys

An address delivered at the Fifth National Foreign Trade Convention, Cincinnati, Ohio, April 18

PROBABLY nothing in late years has done more to carry forward the American export trade than the motor car which, while possibly considered a peace industry, is just now supplying a very important part in the world war program. Not only has the industry made giant strides in domestic trade, but the aggressive methods of its big men have pioneered the American motor car throughout the world, and in many cases supplied countries with the first American products they have ever seen, thus opening the way for other American goods, because the American motor car has brought credit to American industry in every quarter of the globe.

American motor car makers have introduced American methods and American enterprise, not alone into selling, but in supplying service in cities throughout the world, and last year, even with embargoes on practically all the countries in Europe, American trade exceeded $88,000,000 for 65,792 passenger cars and 14,347 trucks—the biggest proportion of the latter, of course, going to the warring nations.

Continuing export by this great industry will help to maintain not alone branches and dealer organizations in various parts of the world, but maintain factory organizations in this country, that must continue as prime factors in the making of war materials. After the war England, France and Germany will be strong competitors of the American motor car trade, and it would be unfortunate if anything should happen to require the American makers to start at scratch again after having established their present lead.

Maintain Exchange Value

Motor car exports represent not alone an important contribution to the prosperity of American labor but also help to maintain the exchange value of the American dollars. Our motor cars are sent to Chile in exchange for nitrates used for the manufacture of explosives and for fertilizer; to Argentina for beef, hides and wheat; to Brazil and the Straits Settlements in exchange for rubber and tin—all essential to our war program.

Exports of the motor car industry in 1917 almost equalled the combined exports of agricultural machinery, electrical machinery and apparatus and all locomotives and railroad cars.

Surely no industry in this country can be considered of any greater importance than the motor car industry, with its giant capacity for production. It has supplied the motor transport trucks, officers' cars, ambulances, tractors for guns, tanks, especially equipped vehicles for the airplane and balloon service, surgeon general's department, motor car kitchens, shoe repair shops, dental trucks, etc., and in addition it has taken on contracts for the manufacture of many kinds of military and naval articles. These include airplane engines and parts, submarine chasers, marine bomb anchors, gun recoil checks, artillery wheels, shells for guns and numerous other things foreign to the motor car trade.

War contracts already undertaken by the industry aggregate more than $600,000,000. Modern motor car plants, with their extensive equipment of machine tools and hundreds of thousands of expert workers in special trades, have unequalled facilities for doing much of the war work required.

Motor car engineers designed the Liberty trucks and Liberty airplane motor and are in charge of truck and airplane production for the Government. Many prominent motor car men are giving their patriotic services to the Government.

The armies having the best transport and the best air service will win. The transport service is organized on a motor truck basis, officers have increased their efficiency many times by the use of motor cars, dispatch riders are mounted on motorcycles, tanks lead the infantry in adances against the enemy, the injured are hurried to the hospitals in motor ambulances, heavy ordnance is hauled by motor tractors, and airplanes keep the commanders advised of enemy movements, drop bombs on their concentrations and depots and pour fusilades from machine guns into his trenches and advancing troops.

The first movement of British forces across the channel was accompanied by the motor omnibuses of London, which carried troops to the front and were then converted into vans to supply fresh beef to the army. Paris was saved from German invasion by a rapid movement of an army of 100,000 men in Paris taxicabs, and Verdun held out against the foe only by a continuous day and night movement of munitions and supplies in a continuous procession of motor trucks.

It was calculated last year that the armies on all fronts were using more than 300,000 motor vehicles.

After commandeering most of the motor trucks and many of the passenger cars in Europe, the French, English and Russian governments turned to the United States to supply the deficiency. During the first three years of the war the United States exported 45,308 motor trucks to England, France and Russia—that is, during the three fiscal years ending June 30, 1915, 1916 and 1917. Nearly all of these were for war purposes, as the exports for the two preceding years amounted to only 410.

It is not known how many trucks have gone to Europe for the American army. These do not figure in the summaries of exports as published by the Department of Commerce. But approximately 20,000 trucks had been bought by the United States army and 10,000 more ordered up to the first of last February, at which time requirements were in sight for from 10,000 to 15,000 more for which orders had not been placed. A considerable part of the first 20,000 had been delivered and sent to their destinations. With the resumption of the German offensive in March the need for redoubled efforts by America indicated the likelihood of heavy increases in orders for army trucks.

But for the part performed by trucks the building of the thirty army cantonments in this country would have required six months instead of three. Trucks were used in large numbers for building roads in the cantonments and hauling the enormous quantities of material needed. All the war activities in this country, as well as in Europe, have been expedited by the motor car and motor truck.

Turned to the U. S. A.

When the motor car factories of England and France were taken over for the manufacture of munitions, not only these countries, but all the countries of the world that were at peace had to depend on the United States for motor cars and trucks. Until the seas were cleared of the German menace by the British and French navies, the exportation of motor vehicles suffered in common with all overseas trade. Since then our export trade in motor cars has been maintained at a fairly constant figure, notwithstanding the difficulties of securing shipping space, enormous increases in ocean rates and prohibitions against importation of motor cars by England, France, Italy and India. It has been almost impossible to get motor cars, and trucks into Russia and Scandinavian countries for private account. Australia prohibited importation of motor car bodies, but recently modified the prohibition so that it is now possible to import two chassis to every complete car.

During the last three calendar years the exports of motor vehicles have been as follows: 1915—commercial cars, 22,094; passenger cars, 41,864; total valuation, $94,884,393; 1916—commercial cars, 18,921; passenger cars, 61,922; valuation, $96,673,108; 1917—commercial, 14,347; passenger, 65,792; valuation, $88,347,739. Adding motor car engines, tires and parts, the total exports of the industry last year amounted to more than $140,000,000, which very nearly equaled the total exports of all railroad locomotives and cars, all electrical machinery and apparatus and all agricultural machinery combined.

Use of motor vehicles in the United States is of secondary importance only to their use in the war zone in Europe. This is because of the critical transportation and food situation. Everything hinges on transportation, and motor vehicles are an

important factor in transportation. Earnest efforts are being made to relieve railroad and terminal congestion by transferring short-haul shipments to the highways.

The number of commercial motor vehicles operating in this country is approaching half a million. It is estimated that they have an average capacity of 2 tons and easily can average 50 miles a day, including time spent in loading and unloading. Thus they have a combined capacity of 50,000,000 ton-miles daily or 15,000,000,000 ton-miles a year. This is a considerable load to take off of the overburdened railroads. If all shipments originating within a distance of even 25 miles of cities are handled by trucks, which make deliveries direct to consignee, the railroad freight houses will be relieved of all this miscellaneous small freight that now causes so much terminal congestion.

Stimulates Food Production

Establishment of rural motor express lines has a most important influence in stimulating production of foodstuffs. They give farmers an assured means of daily communication with markets and permit them to devote all their time to farm work instead of wasting a large part of it driving long distances to market with loads of produce. There are already hundreds of such truck lines in operation, giving dependable and satisfactory service.

Farm labor is scarce and high-priced; there has been a steady drain since the war started on the supply of horses and mules throughout the world, and oats, corn and wheat have increased enormously in price. To increase production of human foods under these conditions means that machinery must be used more extensively in farm work. Motor car and truck manufacturers have begun to turn to the manufacture of farm tractors, which are in urgent demand by European countries and by the United States. Many thousands of such tractors are needed at once.

In the limited time at disposal it is possible only to summarize the many ways in which the third largest manufacturing industry of the country is contributing abroad and at home to the winning of the war. The motor car industry stands solidly behind our Government in its war program; has volunteered its services and resources repeatedly, and has only recently agreed unanimously to reduce by 30 per cent the scheduled production of passenger cars for the year 1918 as a means of helping to conserve the supplies of steel, tin, brass and other materials, reduce railroad freight and the demand on ocean shipping.

Like other industries, it is adversely affected by export and import regulations, railroad car shortage, lack of cargo space and high ocean rates. The industry merely asks that full consideration be given to the importance of the motor vehicles as a labor-saving and time-saving mechanism and that its organizations be kept intact ready for immediate resumption of domestic and foreign trade after the war.

Camping to Colorado

(*Concluded from page* 9)

ment, small items of toilet and dress, etc. Ice averaged 10 cents a day when used. We did not need it in the mountains, and we dispensed with it during the last few days of the home trip by not carrying perishables.

Our food bill may look ridiculously low, but we had all we wished to eat and came back heavier than we had started. I kept a careful account and divided the $31.74 total for the forty-seven days that we were camping and found it made about 34 cents per day per person, or $2.36 per week for each of us. This included breakfasts and dinners, each three times purchased at restaurants and cafeterias. Otherwise I prepared every meal myself. The only food not included in the bill is the trout caught.

In addition to these direct expenses we had certain others before or after the trip. Our car, purchased in May, 1917, about six weeks before we started our tour, cost $1,040. We saved the considerable increase in price early that year by the fact that our order was placed in the fall of 1916. We also had a saving of $5 because we paid the dealer in installments all through the winter and spring and did not call for the car until the last payment.

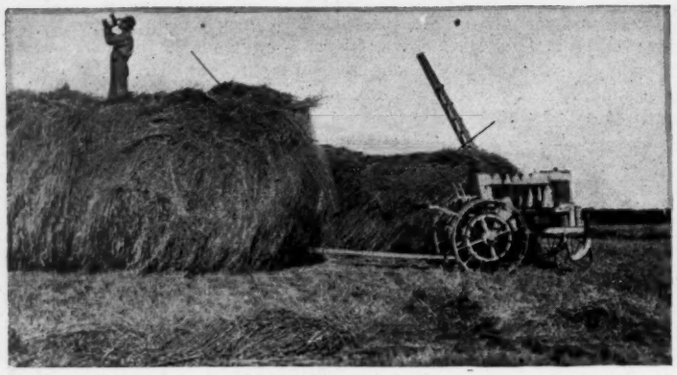
As the cost of the car should be spread over its many probable years of usefulness and should be charged partly, also, to its use for short trips from home during the remaining ten months of every year, the same policy should be adopted toward our camp outfit. We paid more than some would for a comfortable portable living outfit, with the belief that if we were uncomfortable we might never take a camping trip again, while if we could keep physically comfortable we would be anxious to repeat each season for years to come. Our tent, a white elephant, 12 by 14 ft., with one 5 and one 7-ft. wall, was made to order for $32 and proved most excellent for a long stop in one place but unsuited to use for one-night stops, as it took too long to set up and take down and was too greedy of packing space in the car. Our tent cot bed, 44 in. wide, canvas with a waterproof canopy which shed all rain like a duck's back, cost $11.75 from the manufacturer plus 25 cents freight, and it is serving for sleeping outdoors at home in the spring and fall. A folding sheet-iron stove, two-burner, for wood, with telescoping pipe, cost $3.50; a folding table, $2.85—a shelf beneath could have been had for about 75 cents extra—two folding stools, $1; canvas water bucket, folding flat, with rope handle, 80 cents; desert water bag, $1.25; a spade, needed but three times on the road but needed badly then, used to put out a neighbor's fire and to bank earth around the base of the tent to keep out strong mountain winds, $1.10; camp ax to cut fuel, drive tent stakes, sharpen stakes, etc., $1.25; nursery refrigerator, 13 by 19 by 13 in., clamped to the runningboard, $3.95; twenty extra tent stakes to replace those that split, 40 cents; two clamps to hold refrigerator on runningboard, 80 cents—we used similar clamps which had been loaned to us; rope to tie baggage in tonneau, 30 cents; tin and paper tableware, 65 cents; a tin breadbox for staple foods, 85 cents; total, $62.70. We used bedding and cooking utensils from home, but the regular camp cooking outfits of aluminum, each piece fitting into a nest of others and with removable handles, is more convenient to pack.

New Clothing

The only new clothing we bought for the trip was an overall suit for my husband, $3; veil, $1; cotton duster, $1.75; khaki outing skirt, $3.95; cloth outing hat, $1.45; and khaki-colored galatea middy blouse, $1.35. I already had a tan wool outing dress and sweater and my husband owned two wool shirts. Other than this we used our ordinary clothing, taking along several suitcases of it for use during our visits. We also each bought goggles, $2 for the two pairs.

In the matter of car accessories for a long trip there are both must-saves and may-haves, though no two agree entirely upon the classification of the two groups. We consider a tow rope a necessity. Ours cost $1.20. You may not need it at all, but if you do you need it badly, while it may enable you to play good samaritan to some fellow traveler in distress. Having no theft insurance we spent $6.50 for a lock. We also paid $22.50 for one pair of shock absorbers. Next season we hope to install a second pair of them. We invested $3 in a pair of non-glare headlight lenses to enable us to observe the golden rule—toward fellow motorists and to make us safe from violating the rules enforced by some of the larger cities. A Blue Book, a year old, hence reduced, set us back $1.50. Two pocket maps were 50 cents. A spare tire cover was $1.75. This spare was bought second hand for $8 and repaired for $1, with another $5 for a new inner tube for it. Extra lamps and a metal box for them were $2.15; tire pressure gage, $1; battery hydrometer, 80 cents; funnel, 50 cents; heel rest, 25 cents. A thing we did not have and swear we will buy before our next trip is a power-driven tire pump.

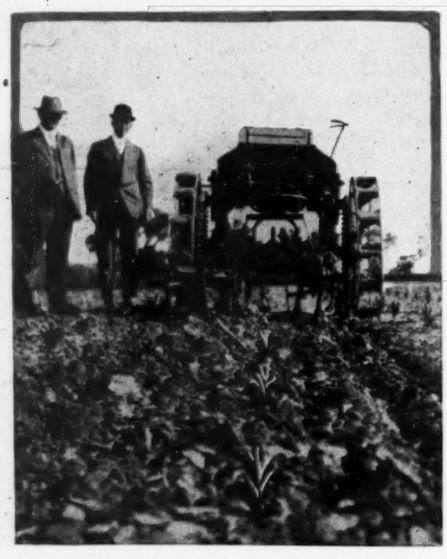
The indirect, or after, charges of the trip may be suggested. Our tires had run about 700 miles before we started. The western trip added 4044 miles. Their total mileage, February, is 5800 miles, and they are now pretty ragged and weak. Of the mileage to date about 70 per cent is chargeable to the vacation trip. As we expect them to stand for our short trips this spring, about 60 per cent of their life would be a fairer estimate of the wear made by the long excursion. The cost was included in the purchase of the car but their market value separately at that time would have been about $120. The same grade has risen in price since then. We plan to have them mended and carry at least two for spares for our 1918 vacation and to get an entire new set, probably cord tires, before leaving home. As we believe it cheaper in the long run never to allow minor faults to accumulate and deteriorate working parts or cause accidents, we took the car to a garage upon our return and had it carefully examined and overhauled, cleaned, oiled, adjusted, etc. This cost $37, and the whole working mechanism now seems 100 per cent efficient.



Hauling hay from field

Pulling the binder

Tractor Versatility



Cultivating corn

Pictorial Proof of Varied Uses

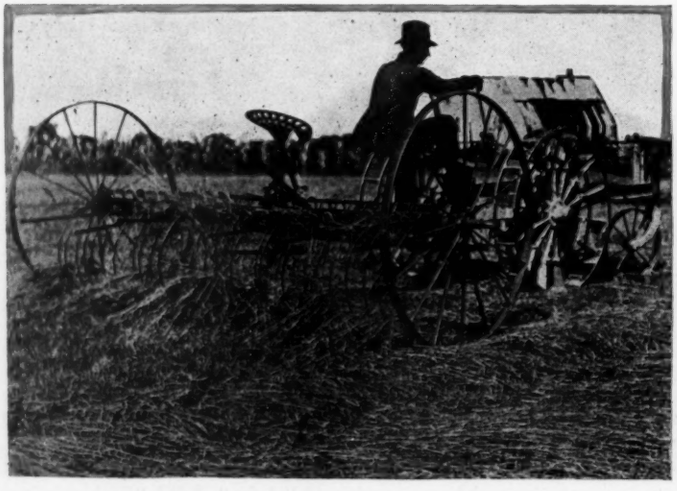
DESPITE all that has been said about the versatility of the tractor and about the many things it will do about the farm to displace horses, very few farmers who own tractors appear to possess either the imagination which will conceive uses or the ability to adapt the tractor to farm work. Most of them continue to regard the tractor almost exclusively as a plowing machine and if they use it in any other way they take advantage of its facility on the belt.

Some farmers, however, refuse to grant limitations to the tractor and make use of it for practically all sorts of farm tasks for which horses have been used heretofore. The farmer whose tractor is shown in the series of illustrations herewith finds use for his machine in plowing, cultivating corn, for all the operations in the hay field, for hauling his manure spreader and for other things of which no pictures were obtainable. The pictures shown were taken on the farm and show some of the actual uses to which the farmer puts his tractor.

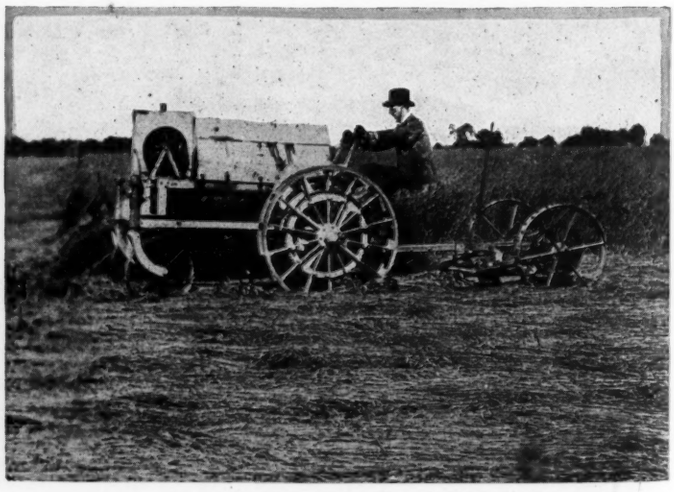
This tractor is the Illinois, manufactured by the Illinois Silo & Tractor Co., Bloomington, Ill., and the variety of farm tasks pictured goes far to warrant the claim of the company that the Illinois is an all-purpose machine.

Plowing in the field

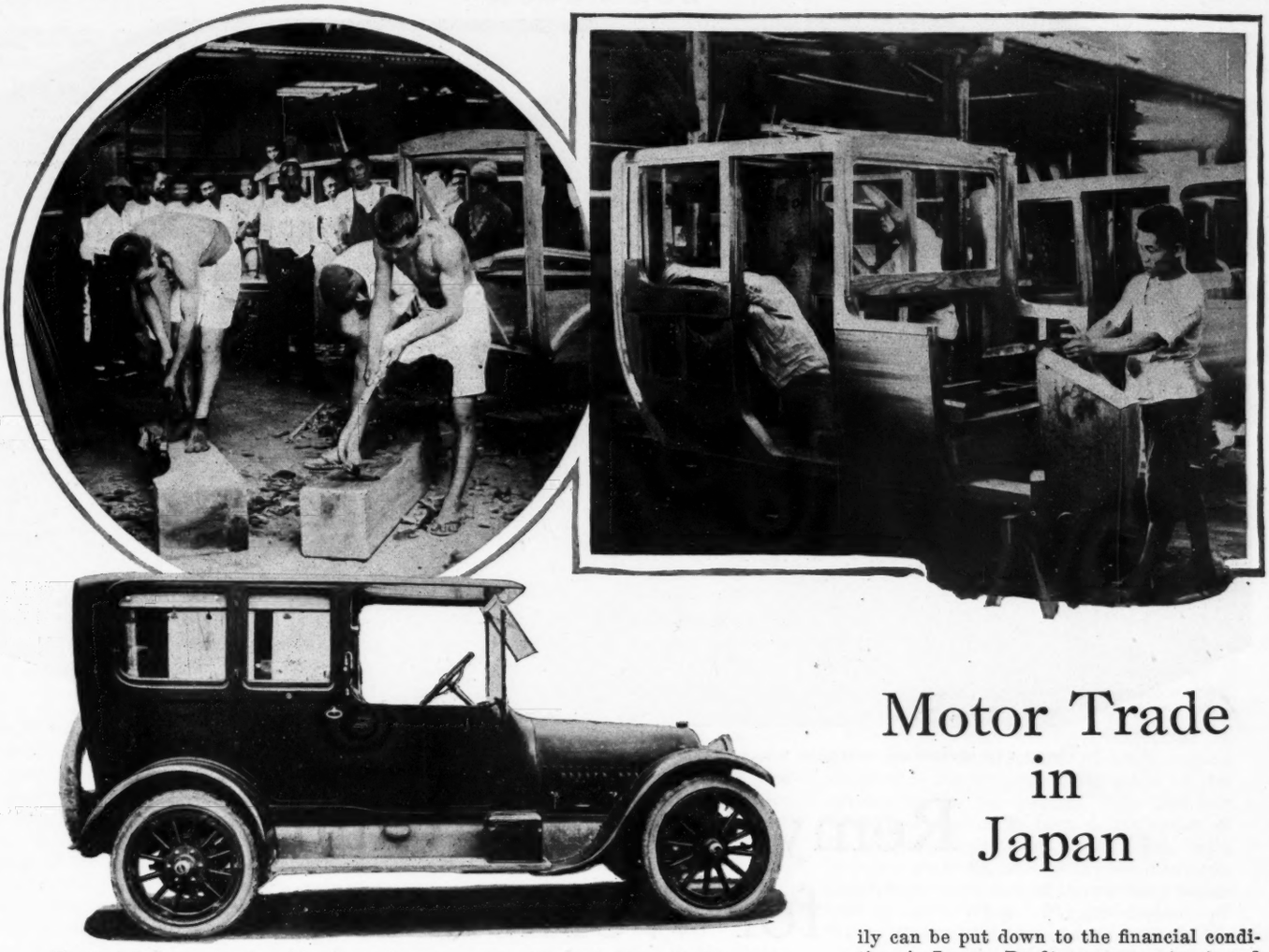
Cultivating, Raking, Plowing



Raking hay in field



Pulling the mower



Typical Japanese inclosed body, with two stages of manufacture by Japanese

Motor Trade in Japan

JAPAN in 1917 purchased twice as many motor cars as ever before in her history. Previous to last year, 1913 was the biggest season the kingdom had ever known in the importation of motor cars, and although the figures and the total number of cars imported that year are not available, their value was $605,016.

These figures were practically equalled during the first seven months, when 344 cars totaling in value $597,632 were imported. While total figures for 1917 are not yet available in America, the importations recorded up to Sept. 30 were 572 cars valued at $1,025,890, so that the importations in Japan for last year doubtless reached 700 cars worth over $1,250,000 at their landed price.

From these figures it can clearly be seen that Japan is advancing in her use of motor cars. The market is not big considered from the standpoint of American business, for there are any number of cities in the United States which distribute even a greater number of cars than go to Japan during the year, and in fact there are numbers of dealers in the United States with much smaller territory considered from the basis of the population who put out a greater number of cars of one make. But from the standpoint of Japan, the business is increasing. At the present time there are practically 2700 cars in Japan. Six years ago 300 cars would have been a very liberal estimate for the kingdom.

During 1914-15, the first two years of the world-war, importations to Japan slumped considerably. In 1916 nearly seven times as many cars were brought in as in the previous year, while 1917 figures will show at least three times as many as in 1916.

The advance in the last two years readily can be put down to the financial conditions in Japan. Profits on war contracts and shipbuilding and shipping have been large. Men who never before were able to consider the purchase of a motor car have now found the way open to have not only one car but many more if they so desire.

The American manufacturer, of course, has had practically a monopoly in Japan in the last few years. He finds it a good market because little change is required in making his chassis suitable for the field. For instance, while the Japanese road rules require driving to the left, just the opposite of ours, and right-side drive is preferred, there is no arbitrary demand for right-side drive. Furthermore, battery ignition is meeting with favor and the absolute demand for magneto practically has disappeared.

The American companies who have done the best business in Japan are those who are prepared to furnish chassis as well as complete cars. The demand in Japan is largely for a closed car of the limousine type. Facilities for building bodies of this kind are part of the plant facilities of practically all the larger dealers, the greater share of them being maintained on lines of six-cylinder chassis. They are all-wood bodies and very presentable, although the tools with which they are fashioned would look very crude in the American body plan.

As a general thing the high-priced American cars are too big to be considered suitable for the Japanese market. It must

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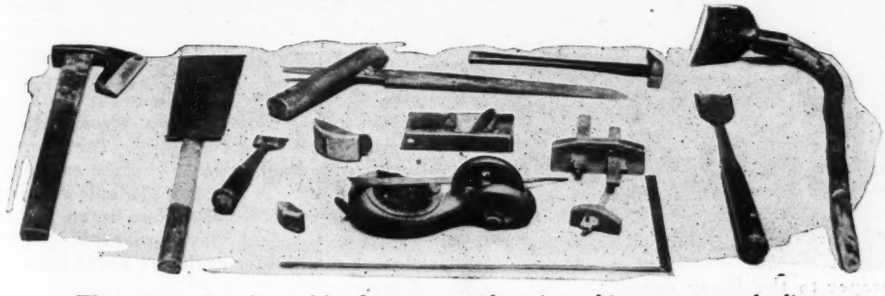


The principal tools used by Japanese workers in making motor car bodies

These are individual cottages which have been erected at the Remy country club for members

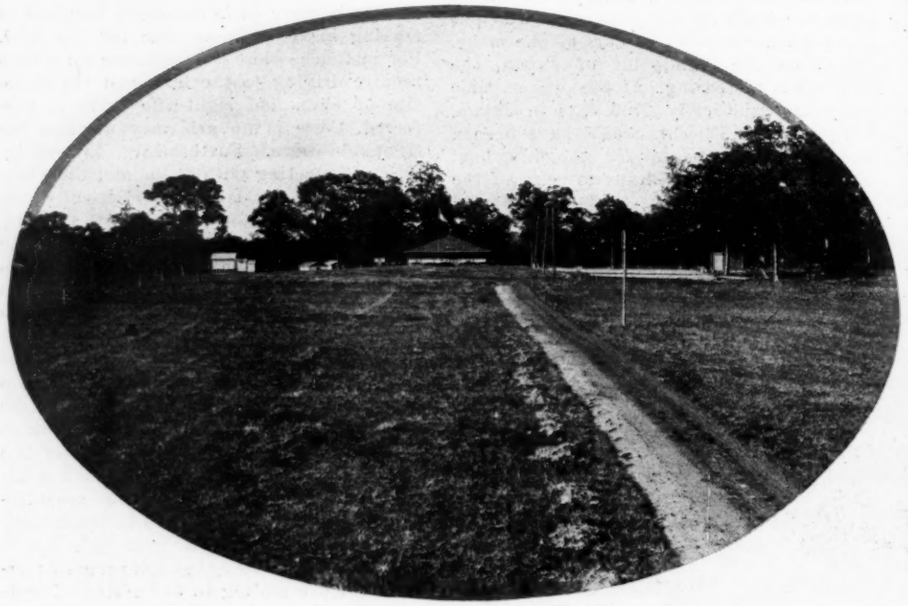
Remy Country Club for Workers

THE Remy country club is a protege of the Remy Electric Co. of Anderson, Ind., for the Remy worker. It consists of a tract of about 8 acres located approximately 4 miles east of the plant on West river. The activities of the club, as in all good country clubs, center about a clubhouse, which extends well back from the main road and overlooks the river. This clubhouse is one that would do credit to any country club.

It contains a large living room, dining room and kitchen, waiting rooms and so on, and large, airy verandas on practically all sides make it an efficient gathering place for those who come with their friends to enjoy the pleasures offered.

The house is well equipped, and an arrangement sees to it that members and guests may obtain excellent meals by notifying the caretakers in advance. Portable cottages have been built on the location for the benefit of the officials of the company and their families. These cottages are light and well ventilated and are equipped with running hot and cold water.

The grounds of the club are laid out for amusements and sports, with provisions for tennis, croquet, quoits, clock golf and other games. North of the clubhouse a rifle range is fitted out.



This shows the entrance proper to the Remy country club. The club has about 8 acres 4 miles from the plant

Clubhouse Only a Part

The clubhouse is only one part of the thought Remy gives to its employees. Motion pictures, a cash bonus plan for all employees, a plan whereby workers can purchase motor cars, special instruction in day and night schools, a co-operative store—these are other features of Remy enterprise for the men and women in its plant.

Many take advantage of the co-operative store, which is on somewhat the same lines as co-operative stores at some of our big universities and colleges. The store is incorporated and operated by the company, however, though it sells all staple supplies to employees at cost. There is an understanding that supplies purchased by any worker shall be for exclusive use in his own home.

There is an organization called the Remy

Relief, for and by the employees. This organization pays both sick and death benefits. It was formed Oct. 1, 1916, and has grown rapidly. Benefits paid during 1917 include nine death claims of $100 each and sick and accident claims to the amount of $3,638.

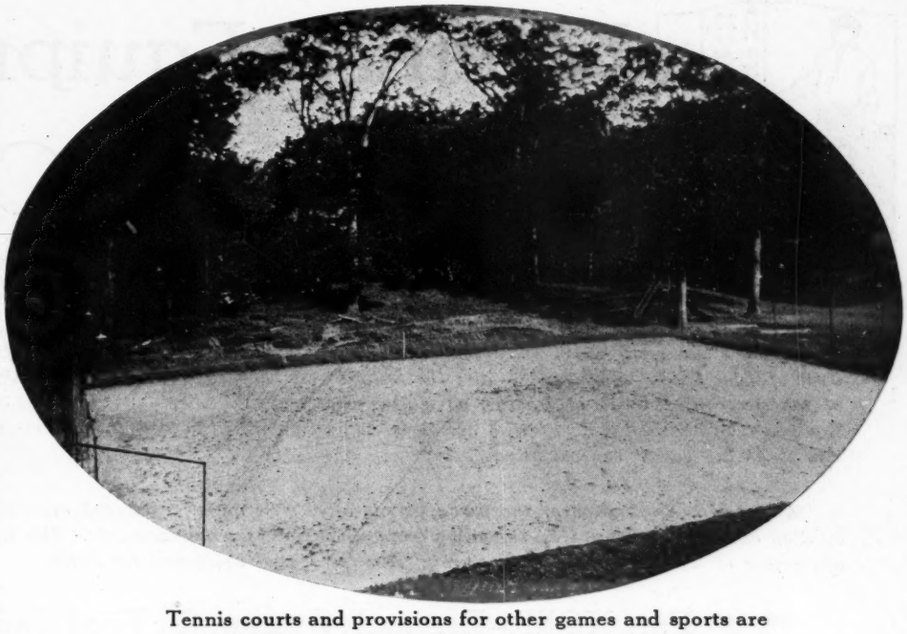
In the schools both the practical and theoretical sides of the industry are studied. A two-year course is given in the electrical night school, and diplomas are presented to graduates. Tuition is entirely free. The Remy service school is operated for those who may wish to specialize in service work. Students who have had instruction in the electrical night school, or the equivalent, are accepted for three months of instruction. Day instruction is given in the various assembly departments, with the idea of enabling the students to apply the fundamentals of electricity to their particular assembly work. Classes are held for foremen to study and review the principles of electricity as applied to the work at the plant.

To enable employees to own motor cars the company advances certain sums, on the principle that the men who work at the Remy factory should drive cars to familiarize themselves completely with their workings.

Cash Bonus Paid

For several years the company annually has paid a cash bonus to all the heads of the production departments. This money generally is awarded at the Christmas holidays. The amount given is based on a percentage of the earnings of the company. A general bonus plan went into effect last October. This provided for payment of a 3 per cent cash bonus based on each employee's earnings for October. This bonus will increase monthly in increments of 1 per cent until a maximum of 12 per cent has been reached. The bonus is paid monthly on the second Saturday after the first Monday in the month with the regular pay and applies to those who are in the employ of the company on the tenth of each month. Any employee who leaves the company during a month forfeits his bonus for that month.

With the Liberty Loan issues the company arranged a bond purchase plan whereby the purchaser gets interest on his investment for the first year.



Tennis courts and provisions for other games and sports are made by Remy. North of the clubhouse is a rifle range

MOTOR TRADE IN JAPAN

(*Concluded from page 31*)

be borne in mind that while Tokio, Osaka, Yokohama and Kobe have some wide streets, the great majority of the roadways are very narrow, making it difficult to handle a long-wheelbase car at the intersection of these narrow streets. This is true also in the country, where the roads, although well surfaced, are narrow and have many sharp turns.

One point which will tend materially to assist in the development of trade in the kingdom is the progress being made on the roads. Up to the present time this advance has practically been in the hands of the military department, roads being built in many sections, chiefly the mountainous districts, to take care of the military transport by motor truck. The governments of Tokio and Yokohama have worked together on the project of highway between the two cities, widening the present route considerably at a cost of approximately $1,500,000. The building of a new road suitable for motor vehicles between Kobe and Osaka is also definitely decided upon. There is much traffic between them.

This would do credit to any park, city or private. It is at the spring in the grounds of the Remy country club

Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the ninety-third installment of a weekly series of articles begun in MOTOR AGE, *issue of June 29, 1916, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., New York, in a size to fit the pocket conveniently.*

A thorough explanation of the fundamentals of electric circuits preceded descriptions of the general types of starting, lighting and ignition apparatus, signalling devices, magnetic transmissions, etc. This is being followed by the installation, care and repair of individual systems, beginning with the special equipment for Fords.

Part XCIII—Eveready System for Ford Cars—Concluded

BEFORE starting see that the spark lever on the steering wheel is touching the contact arm on the master switch. When this is done make sure that the commutator arm on the Ford timer is in a perpendicular position. Should this commutator arm not be as described bend the commutator connecting rod until the arm is perpendicular as directed. This is the last operation and one which must be performed to insure satisfactory retard of the spark for starting. It is advisable before attempting to use the electrical unit to check over the entire installation to make sure that all connections have been made properly.

Extra Battery Connection

The regular battery provided with this system is supplied with an extra 6-volt neutral wire, which must not be used in connection with the lighting installation as described, which provides for the use of 12-volt lamps. The 6-volt neutral wire is provided for the convenience of the car owner for the possible installation of 6-volt electric horns or other 6-volt accessories. The method of installation described provides 12-volt battery ignition for starting purposes, and under no circumstances should the 6-volt neutral battery wire be connected to the battery post on the coil box.

Lighting Operation

When the lighting switch handle is pushed down all the way, the lamps are disconnected; when raised half way, sidelights and taillight are connected, and when raised all the way, headlight and taillight are connected.

Starting Operation

To operate the electrical unit as a motor throw the coil box ignition switch to the battery side and press the spark lever into a position of full retard, thereby pushing the master switch contact arm as far back as it will go. This makes contact in the master switch, and if all connections have been made properly the starting motor will turn over the engine.

Genemotor System for Ford Cars

THE shaft-driven type of Genemotor for the Ford car is a single-unit, two-wire, 12-volt equipment. The electrical unit is mounted on the left-hand side of the engine on a special bracket attached to the engine base and is driven by a special shaft and gear.

Preparation of Engine

Before dismantling the engine be sure that it is in good condition, running smoothly and that the carbureter is properly adjusted. Remove the radiator with all the water-pipe and elbow connections, starting crank and ratchet clutch, fan bracket complete with the fan and belt, fan drive pulley on the crankshaft, timer, or commutator complete, timing gear cover—leave paper gasket in place—engine bolts A and still bolt B, Fig. 505. Clean and wipe the engine carefully to insure perfect seating of all parts.

Cut out the dashboard as in Fig. 506. Remove the felt packing rings around the crankshaft and camshaft from the old timing gear cover, or housing plate, and place them in the new timing gear cover, which sometimes is called the cylinder front cover. Re-assemble the new cylinder front cover in the engine, placing bolts E, F, G and H, Fig. 507, with lock washers, in holes indicated. Leave these bolts slightly loose.

Throw the hand brake lever into the middle position and push the crankshaft back as far as it will go. Assemble the split hub J, Fig. 508, on the crankshaft, inserting hub pin through the set of holes in the hub which give not less than $\frac{1}{32}$ inch and not over $\frac{3}{32}$ inch clearance back of the hub flange and cylinder front cover.

Drive the hub pin K, Fig. 508, in crankshaft, being careful that the ends are an equal distance below the surface of the threaded portion of the hub. Chisel off part of the rivet heads XX in the nose pan of the engine and assemble the gear ring L as in Fig. 509. In some cases it may be found necessary to bend out the sides of the nose pan slightly by a monkey wrench, as in Fig. 509, to obtain the necessary clearance for the gear ring. This clearance should not be less than $\frac{1}{64}$ inch at any point. The recess in the back of the gear ring will permit the insertion of the gear ring past the front of the crankshaft. The gear ring, after being placed in position, should be fastened with the three screws and lock washers provided for this purpose.

Throw the hand brake lever to the extreme forward position to lock the engine, and screw the hub nut M, Fig. 508, on the hub, tightening same with a $\frac{3}{8}$-inch steel rod inserted in the holes provided in the hub.

Replace the cranking handle less the Ford ratchet clutch, using in place of the latter the ratchet pin supplied with the equipment and retaining same in place with two cotter pins N as in Fig. 508.

Remove the leather coupling P, Fig. 505, from the end of pinion shaft. Unscrew the bearing housing cap Q, Fig. 510, from

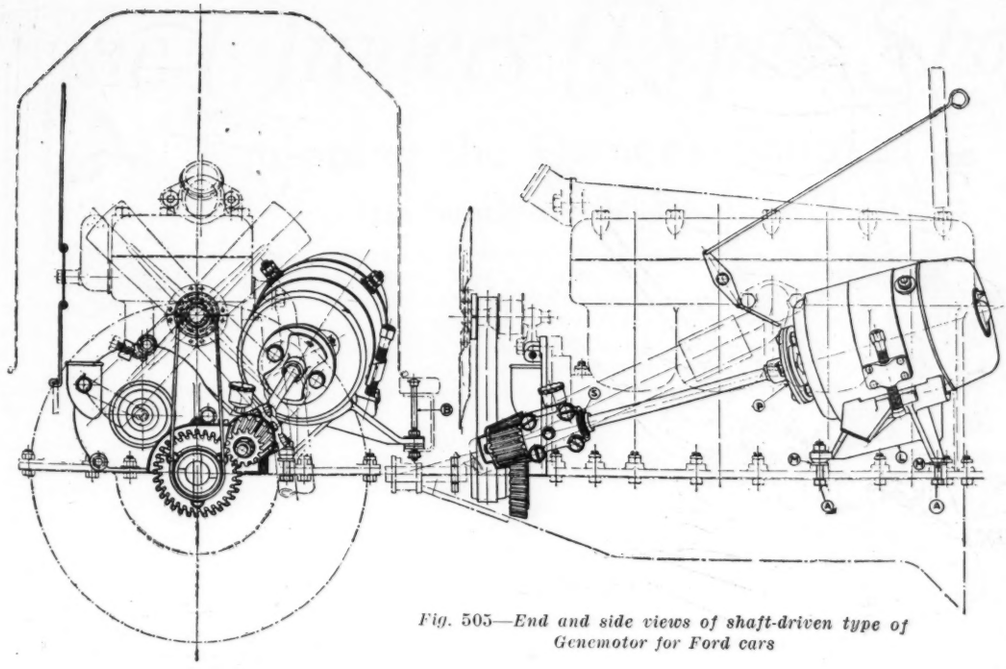


Fig. 505—End and side views of shaft-driven type of Genemotor for Ford cars

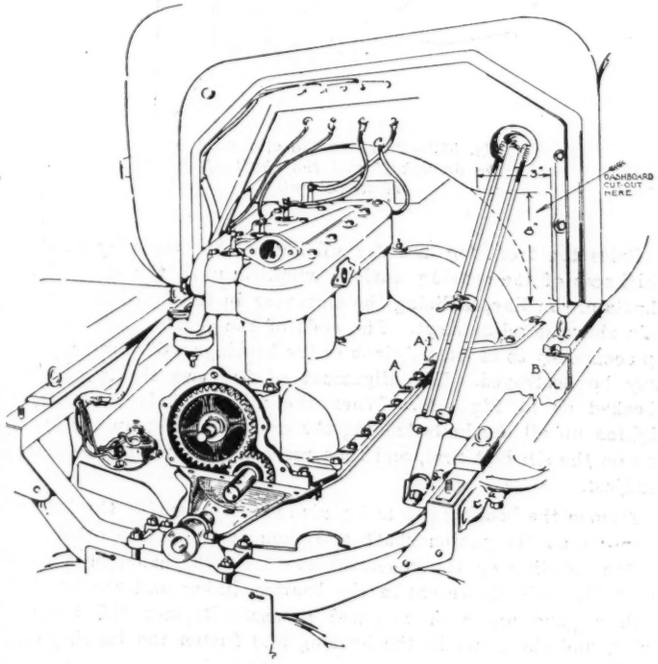


Fig. 506—Ford engine ready for mounting shaft-driven type of Genemotor

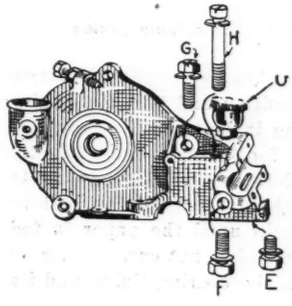


Fig. 507—Timing gear, or front cylinder, cover assembly

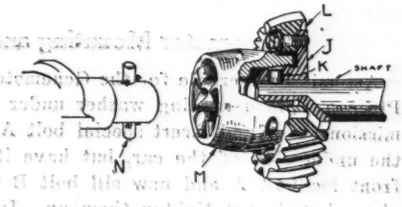


Fig. 508—Method of mounting split hub on the crankshaft

the cylinder front cover, and place the bearing lining, with the pinion shaft, in place. The coupling is keyed to both the armature and driveshaft and should be removed complete by driving it off of either shaft rather than separating the leather from the flanges. Be sure that screw R, Fig. 510, in the bearing cap enters the hole in the bearing lining before replacing the cap and that the shaft does not strike the base of the engine casting which would cause the shaft to become sprung. If necessary file away the corner of the engine base so that the shaft has a clearance of at least $\frac{1}{32}$ inch.

Adjustment of Gears

The steel gear at all times must run on the Fabroil teeth of the pinion and not on its steel shrouds. This may be accomplished be rearranging the steel spacers S, Fig. 505, on the pinion shaft, placing more or less forward or back of the lining as may be

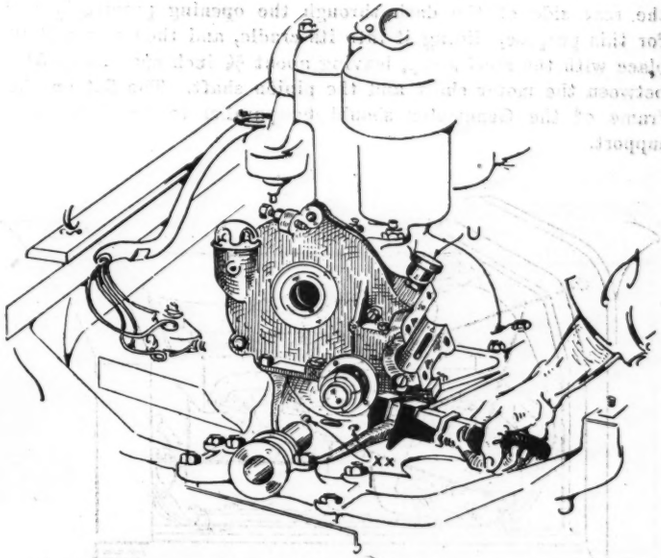


Fig. 509—Bending the nose pan to provide the clearance necessary for the gear ring

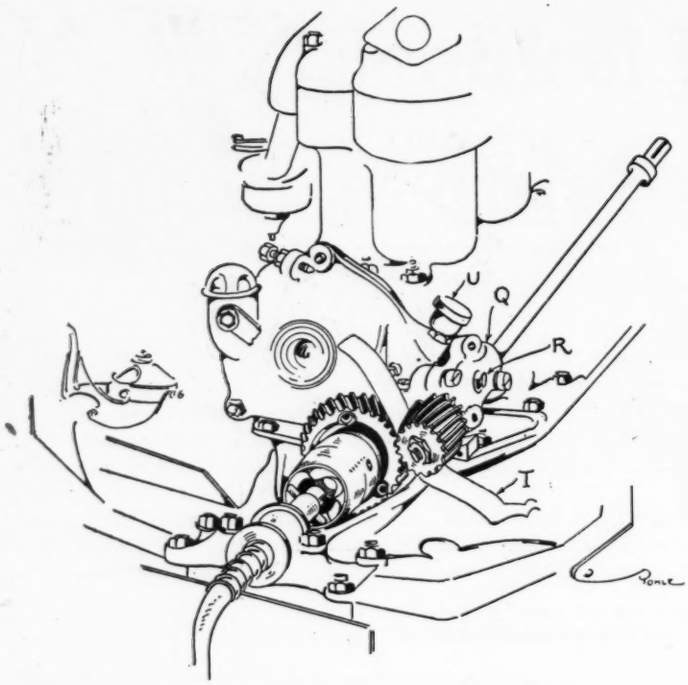


Fig. 510—Adjusting the position of the driving pinion

necessary. In no case should any washers be left out. Throw the hand brake lever to the middle position and turn the engine over with the cranking handle, feeding in between the gears the strip of paper T, Fig. 510, supplied for this purpose. Lightly tap the cylinder cover over to the left as far as necessary to mesh the gears tightly, and then tighten the retaining bolt in the cover. Turn the engine over again until the paper is fed out. The paper should be evenly marked but not cut. Under no circumstances place any shim between the bearing lining and its supporting housing.

Genemotor Mounting and Alignment

Assemble the cradle for the Genemotor in place as in Fig. 511. Place a ⅛-inch spacing washer under the leg nearest to transmission cover and insert special bolt A-1 with lock washer from the under side of the car, but have it slightly loose. Put the front leg bolt A and new sill bolt B with the lock washers in place, but do not tighten them up. Insert the Genemotor from the rear side of the dash through the opening previously cut for this purpose, sliding it into its cradle, and then clamp it in place with the steel strap, leaving about ⅜ inch space, Fig. 512, between the motor shaft and the pinion shaft. The flat on the frame of the Genemotor should be parallel to the iron dash support.

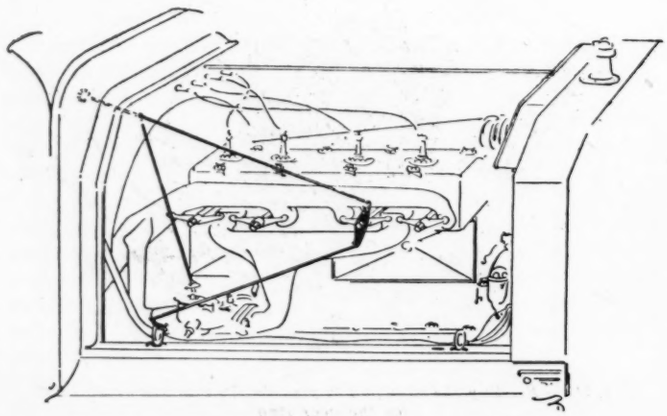


Fig. 513—Method of attaching the primer rod and lever

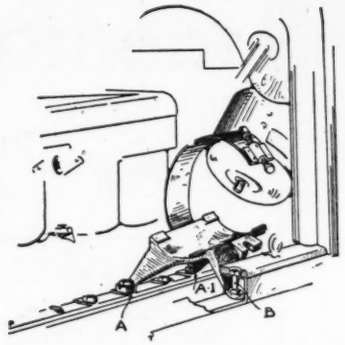


Fig. 511—Assembly of the mounting cradle for the shaft-driven electrical unit

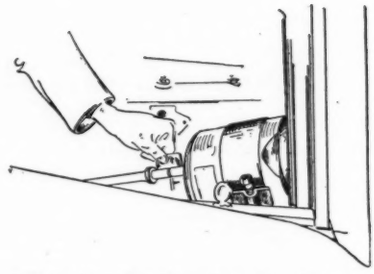


Fig. 512—Checking the alignment of the driveshaft and the shaft of the electrical unit

Raise the front leg and the sill leg of the cradle by suitable thickness of the spacing washers supplied, until the ends of the shafts are in line, utilizing the clearance in the bolt holes to obtain sidewise adjustment. The ends of the shafts must be lined up accurately to at least $\frac{1}{64}$ inch or the bearings will over-heat and may be destroyed. The alignment of the two shafts may be checked as in Fig. 512. When the alignment is satisfactory tighten up all the bolts holding the cradle, setting up the lower nut on the sill bolt first, and then recheck line-up. If necessary, readjust.

Remove the bearing cap and pinion shaft. Assemble the leather coupling on the pinion shaft and then assemble the other end of the coupling on the generator shaft. Both should be a good tight fit. Fill the recess in the bearing lining and the bearing with a good grade of non-acid grease. Replace the bearing lining and the shaft in the housing and fasten the bearing cap in place.

Fill and fully compress the grease cup U, Fig. 510, at least twice to make sure that the grooves and sprockets are filled. Thoroughly grease the gears and assemble the gear guard with its two screws and lock washers.

The timer, or commutator, now may be replaced. Fit the two-piece fan pulley around the neck of the Ford fan pulley and fasten it with the screws and lock washers provided. Re-assemble the fan and the bracket complete to the cylinder front cover, using the new 1-inch belt, which is driven from the pulley, and the gear hub nut M shown in Fig. 508. Replace the radiator and water connections, using the special bolt for the water connection elbow nearest the generator. Replace the timer connecting rod, bending same to pass over instead of under the water connection. The throttle rod must be turned upside down and assembled with the cotter pins toward the dash to clear the coupling. Attach the primer rod and lever as in Fig. 513, using part of Ford timer rod originally coming through the radiator.

Alignment continued next week

The Owners' Repair Shop

Equipping the Owner's Shop

The Bench and Vise

THE owner who is fortunate enough to possess a small private garage for his motor car and more or less handy with tools might as well install some of the useful fitments that go to make up a repair shop. He need not install a great amount of machinery, used only at long intervals, for it would be cheaper to give such work to a shop. But for the owner who wants to make special devices for his car, change the body, or do all his own repairing, which by the way he is more called upon to do this year, a well-equipped shop in connection with his garage is of great value and actually a necessity.

Actual Placement

So far as the actual placement of bench, lathe, drill press, etc., is concerned, this will have to be determined by the owner himself, as the size and shape of the structure will be a factor. If a new garage is being put up, by all means have a bench in it. When the time comes for the annual overhauling, you will be only too glad to have a good place in which to work. A bench is far ahead of a wooden box or sawhorse for holding parts of the car's mechanism. Get plenty of light to the bench. If necessary, cut an extra window in the side of the building. Some owners will want only a bench, with perhaps a vise and other appliance, while others desire a more elaborate equipment consisting of bench, vise, post drill, lathe, grinder, etc. A private garage so fitted is in shape for the owner to carry out almost all kinds of light machine work.

The bench is the most important item, so see that this part of the layout is properly put in. So far as possible the bench should be anchored to the side and ends of the structure, inasmuch as it is very often called upon to resist tugging and pulling at the vise. The exact dimensions, height, width, etc., will have to be determined by the owner, because a bench that may suit the height of one man may be altogether too high or low for another. Theoretically the bench top, or vise, should be about on a line with a man's elbows, as work is done with the arms in this position. By all means have the top sturdy; 2-in. planks should be used, and the width should be as great as possible, otherwise large parts cannot be conveniently handled and other work will become crowded by tools, etc.

The illustration shows a layout for a bench suitable to the average owner's garage and in this case the top has been made with three 2-in. planks, 10 in. wide. No dimension has been given for the length, as this depends upon where the bench is to go. The height given is 40 in., which experience seems to indicate is about the height of the average bench. If desired, the last board, or the one nearest the well, can be made of lighter wood, say about 1 in., but it is not a great deal more expensive to make them all the same thickness.

Hardwood is the best to use; softer varieties are apt to shrink more. Bench tops sometimes are made two-ply, that is, the total thickness of 2 in. is made up of pine or cypress board about 1¼ in., on the bottom placed crosswise on the bench frame, after which a layer of ¾-in. hardwood is placed on top, the boards running lengthwise. This makes a very stiff construction. Usually the top can be made in the conventional way with 2-in. planks. The bench shown has no legs between those at the ends, but if the span is very great, it is better to put in an intermediate support, as the whole structure will be more sturdy. The studding on the side or wall of the building can be used for supporting the inner side of the bench. One of the things to watch is that the bench is level. This may not seem important at first, but better work can be done when you know that to begin with you have an even and square surface.

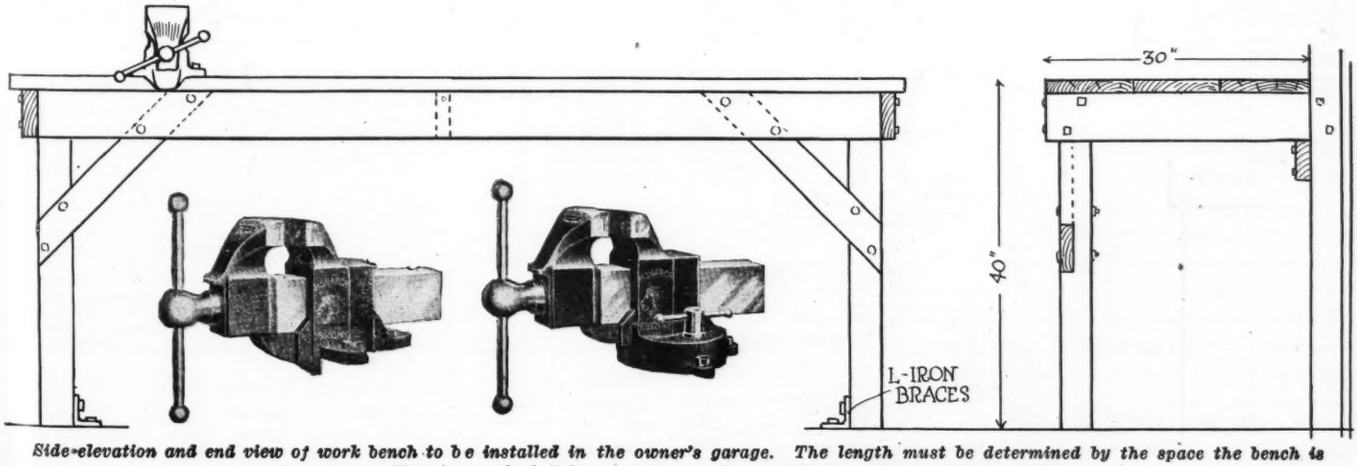
The plank that supports the bench from the studding can be fastened to the 2-by-4s with lag screws, and to get it level make a pencil mark on the end studs, showing the correct height, allowing 2 in. for the top. Thus the height for a 40-in. bench would be 38 in. Put a brad at the pencil marks and stretch a chalk line across them Where the line crosses the studs make other marks, and thus you will have the correct height on each. The top of the supporting plank should be planed perfectly true, and the best way to do is to get the lumber all faced up from a planing mill, if there is one in the vicinity.

Legs for Bench

The bench legs can be made of 2-by-4s and the number needed is determined by the length of the bench. The average installation will require probably but one intermediate leg. If there is a wood floor the legs can be fastened with L-shaped pieces of iron screwed to the floor and legs. If a new garage is to be built with cement floor, proper supports can be put into the cement so when the latter sets, the supports will be held firmly. If there is already a cement floor, break away some of it for the bench legs and put the latter in place, building up around it with fresh cement. The leg can be run right up to the bench top making it a little longer than necessary, for it can afterward be sawed off to the correct height. If the bench is built all the way across the ends of the structure, no posts will be needed at the ends, for the side studding can be used to fasten supports to, the same as was done on the other wall. The bench shown is fastened to the wall on one side only, the ends being supported by legs. But, if possible run it the full length; it will be much sturdier. If legs are used, put braces in them, as shown, notching the legs for the pieces. Use bolts with large washers wherever possible as they are much superior to nails. Lag screws will do for fastening to studs, and bolts on the legs and other parts.

When the framework is in place put the top on. These planks should come from

(*Concluded on page 45*)



Side-elevation and end view of work bench to be installed in the owner's garage. The length must be determined by the space the bench is to occupy. The vise on the left has a stationary base, while the other is of the swivel type

The Readers' Clearing House

The Electric System

Wiring 1915 Premier

Q—Give wiring diagram for a Premier 1915 model, seven-passenger touring car with Remy starting and lighting system.—R. F. Dixon, Springfield, Ill.

This is shown in Fig. 1.

Wiring of Locomobile and Mitchell

Q.—Give internal wiring diagram of the Westinghouse system used on the 1915 Locomobile.

2—Where can I get an internal circuit of the Esterline system used on the 1913 Mitchell car?—Louis Hess, Chicago.

1—An internal wiring diagram of this system is not available, but in Fig. 2 we are showing the general wiring of this car.

2—This diagram was published in the April 11 issue of MOTOR AGE in the Readers' Clearing House.

Testing Ford Coils

Q.—Give diagram showing wiring and connections for stand to be used in testing Ford coil units. What kind of gage should be used? Could I use 110-volt alternating current for same?—F. O. Barney, Seattle, Wash.

About the easiest test you can make for Ford coils is to interchange a suspected unit with one that is known to be in good condition. It is a difficult matter to test for short-circuits unless suitable apparatus is at hand. There is little use in the average repairman or owner trying to determine the nature of a fault in a coil, for unless the trouble is around the terminals of the coil, the latter will have to be sent to the makers anyway.

There is on the market a piece of apparatus for testing Ford coil units called the Jefferson combination tester, made by the Jefferson Electric Mfg. Co., Chicago. This device connects with a 110-volt alternating-current system and has a testing rack for spark plug tests, single- and double-contact lamp sockets, flexible spark gap and contact button. The spark gap is for testing the spark length produced and as the tester works on alternating current, the same as that generated by the Ford magneto, the results are said to be better than when a storage battery or dry cells which generate direct current are used.

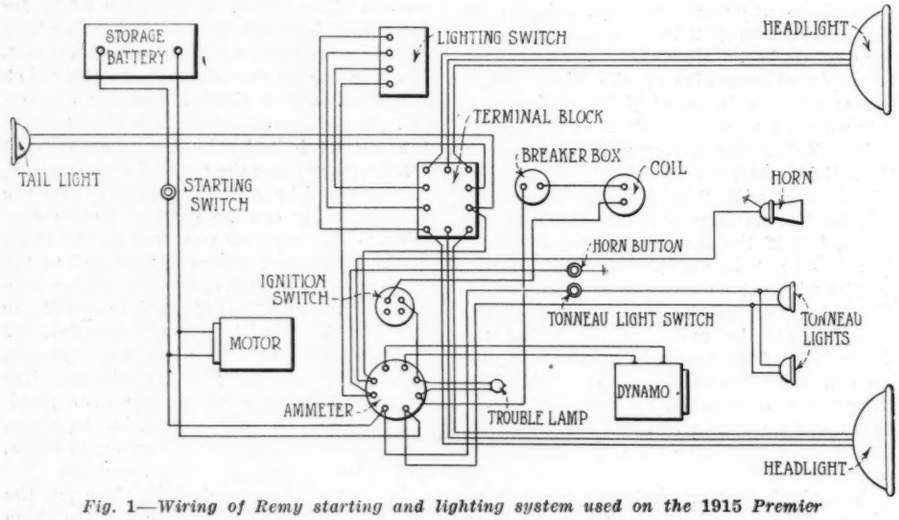


Fig. 1—Wiring of Remy starting and lighting system used on the **1915** *Premier*

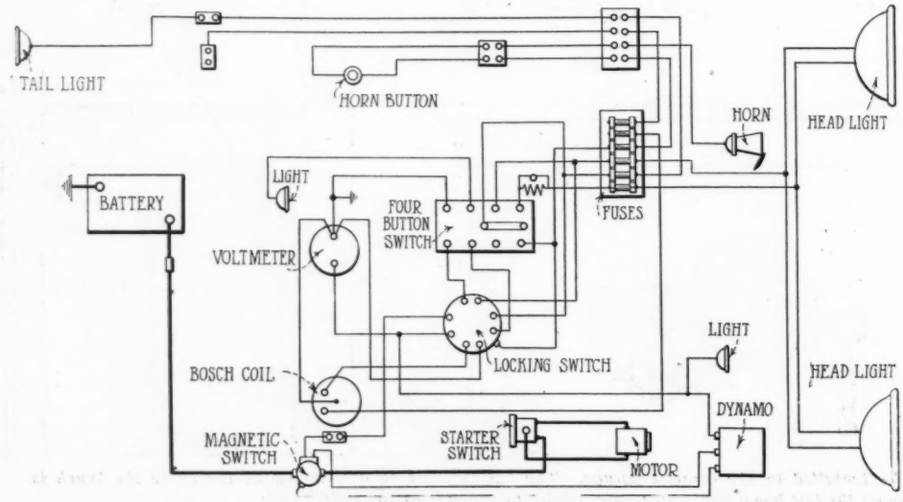


Fig. 2—Diagram of starting and **lighting** *system used on the* **1915-1916** *Locomobile*

Fuse On 1916 Maxwell

Q.—Can the 1916 and 1917 Maxwell switch panels be wired with a fuse between the generator and the battery as the 1918 model is? Give wiring diagram of same.—G. U. Gobberdiel, Pocahontas, Ill.

In Fig. 3 is shown the method of connecting the fuse in the positive generator line. The fuse, which should be of no more than 20 amp., can be installed anywhere in the line of the charging circuit. Find the terminal on the switch panel marked dynamo postive, and the wire connected to this is the one to open up for installing the fuse.

The only advantage this fuse would have would be to prevent burning out the regulator coil should the cut-out points become stuck, allowing the current to discharge from the battery through the generator, while the engine was running. This would happen only through improper adjustment of the cut-out points, and the fuse would not overcome the trouble although it would prevent the damage mentioned.

Rectifier on Ford Magneto

Q.—Is there enough excess current from a Ford magneto to keep a battery charged? Would it be practical to install a rectifier on a Ford, so a battery could be used for lighting purposes? If so, who makes the rectifier and what would one cost? If it would be practical to install a rectifier, show your method of installing same? What capacity storage battery would be best suited for lighting purposes?—William H. Davis, Pontorsu, Ill.

According to the makers of the Matthews rectifier there is a certain amount of surplus current in the Ford magneto which can be converted into direct current for charging a small battery. This rectifier takes the place of the regular Ford timer and is mounted upon a vertical shaft like most distributers. It is made by the Consolidated Utilities Corp., Chicago, and the price is $17.50 for the rectifier alone. With battery, the price is $29.50 while the complete outfit, with spotlight, wires, etc., is $33. Enough current is saved by this rectifier, it is claimed, to keep a 6-volt battery charged.

Vibrator Keeps Buzzing

Q.—I have had a little trouble with a Ford coil. No. 4 coil will vibrate continually when the engine is running. It might run that way for half a day at a time and then suddenly stop again. Then it might run all right for a couple of weeks. This car did this half a dozen times last summer. I changed the timer wires, looked over the timer and cleaned that several times and there isn't anything touching the timer that would be apt to short it. There isn't anything between the coil box and the timer that can cause a short. I even ran a special wire from the timer to that particular coil and changed coils, too, and the coils and coil box were entirely dry. No one has been able to locate the trouble as yet.—H. J. Erickson, Coon Valley, Wis.

A steady buzzing of one of the coil unit indicates a ground circuit somewhere in the wires going from commutator, or timer, to the coils. A ground like this also is indicated by the pounding in the engine

on account of the premature explosion. If the trouble always is confined to No. 4 coil, even when all four are interchanged, it shows that the trouble must be in the timer leading to that coil. Since you substituted a wire for the regular one and the trouble continued, we are inclined to think the latter is in the timer. There may be an internal defect in the timer which is causing a short to the No. 4 segment, so that it acts in the same manner as though the roller were in contact with it.

Solution for Rectifier

Q.—I have a small rectifier that uses 110-volt alternating current. It is composed of a small transformer, which I think reduces the voltage to about 10 volts and a jar with zinc and aluminum poles filled with some solution. I wish to replace this solution. What must I use?—R. C. McNamara, Pierceton, Ind.

The solution generally used for this is made with about 1½ lb. of sodium phosphate to a gallon of water.

Distributer Plate Fouls

Q.—I have a new G4 Eisemann magneto and the distributer fouls in a few miles, so that it shorts and stops. I have cleaned this plate several times with a cloth moistened in gasoline, but it does not appear to overcome the trouble. What would you suggest to remedy this?—Reader, Maddock, N. D.

This would seem to be due to rapid wearing of the carbon brushes. Be sure the brushes are of good quality, as carbon dust may form a connection between the distributer segments and cause a spark at the wrong time or stop the engine completely. Cleaning and new brushes of good quality is the remedy. After cleaning with gasoline the inside of the plate should be given a very thin film of oil to prevent excessive wear of the brush and plate.

Voltage Curve of Ford Magneto

Q.—Publish curve showing voltage of Ford magneto at various engine speeds. What percentage of this current is consumed by the ignition system and what percentage by the lighting system?—W. H. Kellem, Chicago.

A curve showing the rise in voltage with increased engine speeds of the Ford is shown in Fig. 4. At 200 r.p.m. the amperage is about 3 and something like 5 amp. are delivered at engine speeds of 1500 r.p.m. If the lamps are 8-volt each and connected in series they will consume 16 volts. Nine-volt lamps are the ones generally used and these will consume 18 volts. The ignition system will operate on as low as 6 volts. Of course, this is for the primary circuit, as the voltage is stepped up considerably in the coils, producing a high-tension current.

Setting Magneto Armature

Q.—How can I assemble a Remy magneto, that is, the armature distance in the fields and where do points break? Where should the distributer brush be on the distributer segment when the arm is set right with the field? Does a battery that is fully exhausted act as an open circuit on a 1914 Jeffrey 12-volt system?—B. F. Stempsey, Youngstown, Ohio.

To get the proper setting of the armature in relation to the pole pieces when the break occurs at the interrupter points it is necessary to understand what happens in the magneto when the spark occurs. Refer to Fig. 6, which shows the cross-sectional view of the armature and pole pieces when the spark occurs, with the interrupter housing at full advance. Just as the check of the armature breaks from the pole piece, the magnetic flow of the lines of force takes place. At this time the flow of current is strongest and the interruption of the flow in the winding A ought to take place. Hence, if the interrupter housing is placed in the advanced position and in such a way that the cam is separating the points, both these actions will take place.

The break of the primary circuit is made to occur when the cheeks of the armature almost bridge the gap of the top and bottom of the pole pieces. In other words, the interrupter points should just be breaking when the armature is leaving the vertical position. The distributer brush should be in the center of one of the segments when the armature is in this position. To get this position you must remesh the distributer and armature gears.

Charging Several Batteries

Q.—I have a 60-volt dynamo, 83 amp., 5 kw. I want to use this in recharging starting and lighting batteries. How many 6-volt and 12-volt batteries can I charge at a time? Show diagram.—J. A. Stephens, Marion, Ky.

When more than one battery is to be charged they must be connected in series, that is, the positive terminals must be connected to the negative of the adjacent battery and so on, leaving one positive and one negative terminal for connection to the charging apparatus.

This method, however, has several disadvantages, especially if the batteries do not all have the same charging rate. The ones with a small rate will be overcharged and heat up considerably in attempting to handle the excess current. This may result in permanent injury. All the batteries should be of about the same voltage and have same charging rate. It is also quite important that they be in about the same state of discharge, as shown by a hydrometer.

There is one way you can charge several batteries of different voltages and that is by having several charging circuits in parallel and connecting enough batteries in series on each circuit to obtain the correct charging circuit. Thus batteries of various capacities can be charged at the same time, each circuit being made up of batteries of about the same capacity. It is important that the sum of the voltages of the batteries so connected does not exceed the voltage of the charging circuit. The effect would be to have the batteries discharge back into the line. With your

TO assist readers in obtaining as a unit all information contained in this department on a certain subject in which they may be most interested, such as ignition, carburetion, etc., MOTOR AGE has segregated inquiries into classes of allied nature. Questions pertaining to engines will be answered under that head, and so on.

THE ELECTRIC SYSTEM

R. F. Dixon.....Springfield, Ill.
Louis Hess.....Chicago
F. O. Barney.....Seattle, Wash.
G. U. Gobberdiel.....Pocahontas, Ill.
William H. Davis.....Pontorsu, Ill.
H. J. Erickson.....Coon Valley, Wis.
R. C. McNamara.....Pierceton, Ind.
Reader.....Maddock, N. D.
W. H. Kellem.....Chicago
B. F. Stempsey.....Youngstown, Ohio
J. A. Stephens.....Marion, Ky.
B. F. Sanders.....Memers, N. C.

CARBURETION

W. C. Schwarz.....Edwardsville, Ill.
M. Torgerson.....Wheaton, Minn.

ENGINES

Reader.....Yankton, S. D.
R. McFarren.....Gary, Ind.
Reader.....Chicago
W. H. Flanagan.....Columbus, Ohio
B. F. Sanders.....Mamers, N. C.
B. F. Stempsey.....Youngstown, Ohio
W. L. Cline.....Carlisle, Ohio
Budd Ritchie Springhill, Nova Scotia
C. E. Hawdsley.....St. Louis, Mo.
M. Torgerson.....Wheaton, Minn.
E. V. Zeidler.....Palo Alto, Cal.
A. Peterson.....Wallingford, Iowa

REBUILDING

Julian F. Brasor.....Chicago
William Kopp.....Santa Barbara, Cal.
M. G. Roth.....Reading, Ohio
William J. Lechner....Muscatine, Iowa

No communication not signed by the writer's name and address will be answered in these columns.

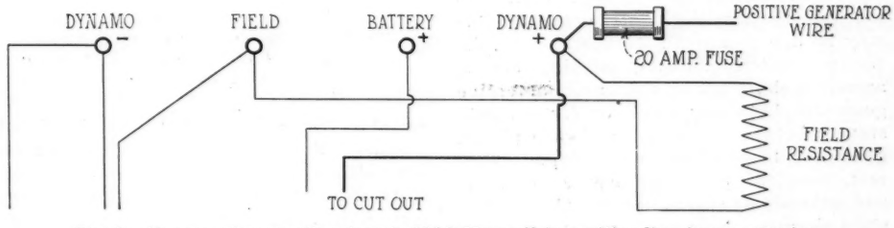


Fig. 3—Manner of connecting fuse in 1916 Maxwell in positive line from generator

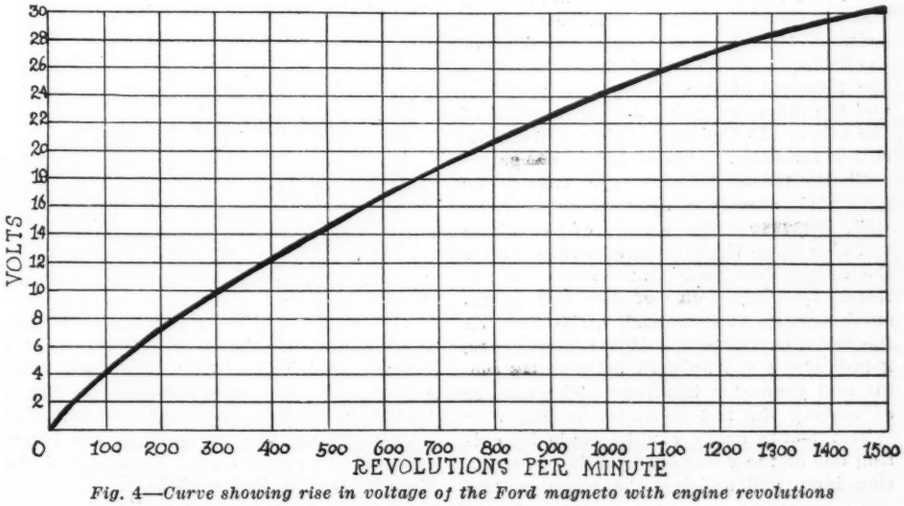


Fig. 4—Curve showing rise in voltage of the Ford magneto with engine revolutions

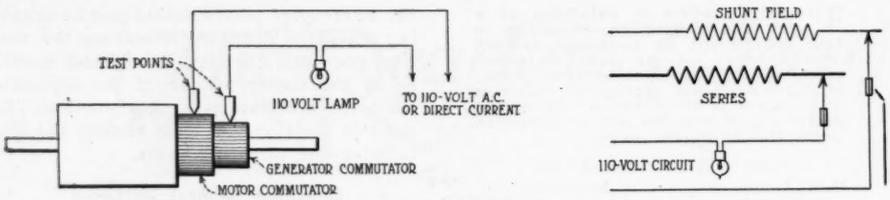


Fig. 5—Testing Cadillac motor-generator with test points connected to 110-volt circuit

dynamo, which must furnish direct current, you could charge ten 6-volt batteries or five 12-volt batteries at the same time. You can make up combinations of the two sizes, but be sure the voltages do not exceed 60.

The amperage must be cut down to that of the smallest battery, which you will find stamped on the case. Introduce enough lamps into the charging circuit to cut down the current required. A voltmeter and ammeter should be connected in the circuit, as shown, to determine the voltage and amperage of the charging current. The illustration in Fig. 7 shows but one battery being charged. To charge additional batteries slip off the positive wire on the battery and hook it up with the negative terminal of the next battery, finally connecting the positive terminal of the last battery to the positive wire of the charging circuit.

His Car Starts Hard

Q.—I have a 1914 Cadillac, but the starter has been giving me considerable trouble. I have had it worked on by a good mechanic but with no success. It goes as if the battery was very weak, but I had the battery charged at a service station and also have taken the battery off another car to try it, and neither one seems to help give any more power. When I push in my starter pedal, it will turn the motor not over a quarter of a turn and then stop. If I still hold the pedal down it will turn the motor another quarter of a turn in about 30 sec. I also had the armature shaft turned and new brushes fitted. Are there any coils or windings in the starter that could be burned out or ground that would cause this trouble? If so, please explain how I could test for this.—B. F. Sanders, Mamers, N. C.

If the armature fails to start when pulling out the ignition button the trouble may be due to a weak storage battery, defective switch contacts, sticking clutch, armature shaft out of alignment, defective generator bearings, waste or foreign substances between armature and pole pieces, generator brushes not making good contact, loose, dirty or improper connections and grounds or short-circuits. To test for short-circuits between motor-generator windings, test points should be used in the manner shown in Fig. 5. The test here is between the shunt and series winding of the field coil. Place one of the test points on the terminal of one of the field windings and the other test point on the terminal of the other. If the lamp lights a short-circuit is indicated between the windings.

Short-circuits between the motor and generator armature coils in most cases will decrease the speed of cranking and also cause the armature to rotate after the engine has been shut down. This is tested by placing one of the test points on the generator commutator, the other on the motor commutator. If the lamp lights, it indicates a short-circuit between the motor and generator windings. The manner of making the test is shown in Fig. 5.

Test points easily can be made by cutting one of the wires of an ordinary extension lamp and splicing the wires to two

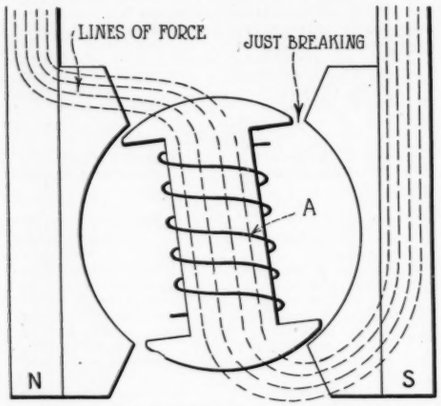


Fig. 6—Cross-section of armature and pole pieces when spark occurs

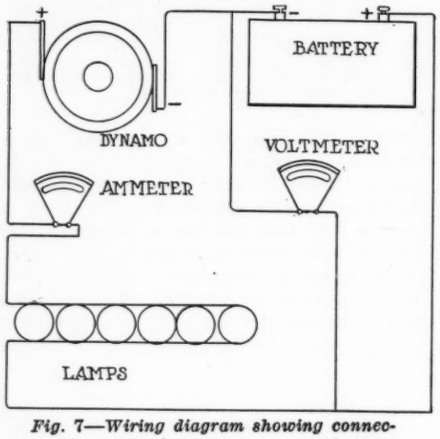


Fig. 7—Wiring diagram showing connections when charging storage battery from dynamo

suitable test points fitted with insulated handles. Such a device is better than a low-voltage outfit with bell or buzzer. With the latter a ground or short circuit may not exist, but the resistance is so high that enough current will not be forced through it by the dry cells to operate the bell or buzzer.

Carburetion

Operation of Air Washers

Q.—In the Feb. 21 issue of MOTOR AGE I notice a call for a carbureter air cleaner. Publish the principles of construction of a few cleaners now in use, as well as some which have proved a failure. I have in mind one which I think will do the work satisfactorily, and if someone has not already tried out my idea, I would be glad to complete mine and give the public the benefit of it.—W. C. Schwarz, Edwardsville, Ill.

It would be a difficult matter to give you descriptions of the many types of air cleaners which have been developed from time to time, but we are showing in Fig. 9 two types which appear on two tractors of present design, the one made by the International Harvester Corp., Chicago, and the Case T. M. Co., Racine, Wis

On the International the air strainer, shown at the left, is fastened to the fuel tank support at the rear of the radiator. Air is carried from the strainer to the air heater, which is part of the exhaust pipe, by flexible tubing. The purpose of the cotton flannel covering is to screen out all the fine particles of sand, grit, etc., which, if drawn into the cylinders of the engine, cause them to wear rapidly. It depends upon operative conditions how often it is necessary to remove the cloth for cleaning. Eventually the cloth must replaced with a new one.

The other cleaner, or air washer, fitted on the Case tractors, is of the water-chamber-and-float type but differs from similar washers by the interposition of screens through which the air must pass on its way to the manifold. The screen is of 32-mesh. It is claimed that by passing the air through a screen just before it enters the water it is so broken up that it cannot pass in large bubbles or carry any quantity of dirt with it. After passing the water the air must penetrate another screen before it enters the manifold. The washer is equipped with a glass gage to show high and low marks.

Another type of cleaner, not shown, consists of several sloping surfaces inside a large cylinder over which water flows and through which the air must pass on its way to the engine. It is claimed with such an arrangement that the particles in the air are carried away by the flow of water, which deposits them in the bottom of the cleaner.

Air-Friction Carbureter Setting

Q.—Give directions for adjusting an Air-Friction carbureter. When is it necessary to replace the disk in this carbureter?—M. Torgerson, Wheaton, Minn.

The only adjustment of this carbureter is the needle valve regulating the flow of gasoline. The adjustment screw is located at the top of the carbureter. Turning it to the right allows less fuel to flow, and more is fed by turning to the left. The air supply is controlled from the dash. Replacement of the disk should be necessary only in the event that it is damaged.

Engines

Timing Waukesha Engine

Q.—Instruct how to time a Waukesha engine in a 1913 Heider tractor, four-cylinder.—Reader, Yankton, S. D.

Turn the engine over until No. 1 piston is at upper dead center, shown in Fig. 8. To determine when the piston is at upper dead center, remove the cylinder head plug and insert a steel rule, R, or any marked stick. Rotate the crankshaft and watch while the rule R comes up. When it ceases to rise then the piston will be at upper dead center.

Draw two lines across the back side of the flywheel. Next measure off 53 deg. on each side of the center line at the lower half of the flywheel.

Note the pointer A. This pointer points to the exact top center of the flywheel. The arrow on the dead center line on the diagram on the figure shows where pointer A points, looking at the back side of the flywheel. Turn the engine over slowly until the arrow points directly on the line 3 as indicated in diagram.

Remove the idler and see that the pushrod J is in its lowest possible position. Place a thin piece of paper between the pushrod J and the valve stem X. Turn the camshaft gear slowly toward the right until the paper is held tightly. Be sure that the valve stem X has not raised any. Also be sure that the camshaft gear retains its position and that the piece of paper is still held tightly.

Place a wooden wedge between the camshaft gear and the case to keep this setting. This will give you the free use of both hands to replace the idler gear. Replace the idler gear and remove the wooden wedge.

Give the engine a slight turn, say about ½-in. on the flywheel. Now see if the exhaust valve X has raised any. It should if the instructions have been carefully carried out. You can now replace the gearcase cover and the cylinder head plug.

If it is impossible to get at the flywheel, remove the cylinder head plug, insert a ruler as shown in illustration. When the upper dead center has been determined, measure the distance from the top of the piston to the top of the cylinder. For example, let us say it is 2 in. See arrow marked D in Fig. 8.

Now slowly turn the engine over until the distance from the top of the piston to the top of the cylinder measures 7.582, or 7⅝ in. This means that the piston has made a drop of 5⅝ in., at which place the exhaust valve X should just start to open. To set the valve and complete the timing refer to the preceding paragraphs.

This setting pertains only to Models L-LU4, M-MU4 and P-PU4 engines.

For models O-OU4-OU4R, S-SU4-SU4R, R-RU4-RU4R, N-NU4-NU4R the piston should drop 4.843, or 4⅞, in. from upper dead center, that is, the exhaust valve should open 50 deg. before the piston reaches the bottom dead center after the explosion has taken place.

For Models T and TU4, B and BU4 the piston should drop 4.644, or 4⅛, in. from upper dead center; or the exhaust valve should open 45 deg. before the piston reaches the bottom dead center after the explosion has taken place.

Pistons in Old Buick

Q.—I have one of the last Buick model 10 roadsters, which is in good mechanical condition. Would it pay me to fit a set of aluminum pistons to this engine? I have good power now, but I need a new set of pistons and thought it would improve the engine by installing aluminum pistons. Would they increase the speed of this car? Do you give aluminum pistons the same clearance as cast-iron pistons? Will aluminum pistons always slap until the engine is hot?

2—Could a sliding gear be installed in this car instead of the planetary?—R. McFarren, Gary, Ind.

1—According to some makers it is satisfactory to equip old engines with aluminum pistons, especially if they are four-cylinder engines. Good light-weight cast-iron pistons also give excellent results in such instances. You may not get a noticeable increase in car speed by fitting light-weight pistons, either aluminum or iron, but it is sure to give less vibration and for hillclimbing they are just the thing. Aluminum pistons must be given greater clearance than others, from 0.004 to 0.006 in., whereas cast-iron pistons can be fitted 0.002 to 0.003 in. Piston slap depends upon the fitting and construction of the piston.

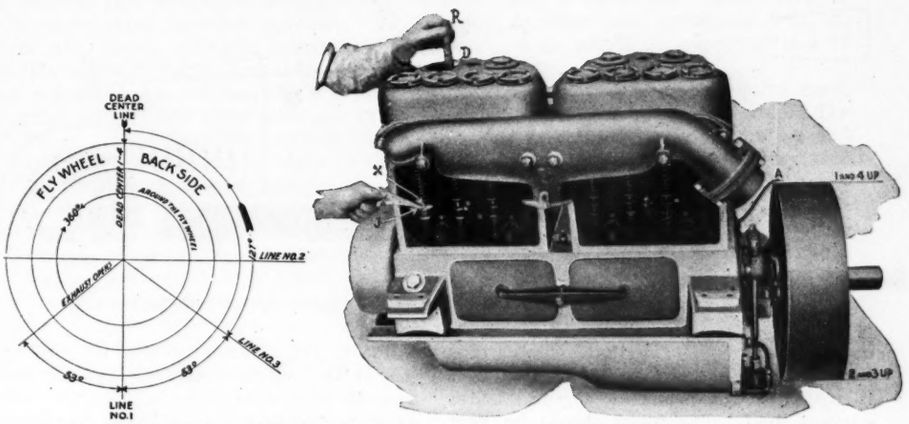


Fig. 8—Timing engine of 1913 Heider tractor. The rule R is for getting the piston to top dead center. The timing diagram is at left

Some makers claim they can fit aluminum pistons as close as the cast-iron with no piston slap when starting up. We suggest if you intend fitting them to take the matter up with a concern specializing in this work.

2—This is physically possible, but the expense would not warrant the gain.

Aluminum Pistons on Hupmobile

Q.—Would I get better results by fitting aluminum pistons in a 1915 Hupmobile?—W. H. Flanagan, Columbus, Ohio.

Fitting aluminum pistons in an old engine will not increase the power necessarily. It may do so if the cylinders have been scored and the bores reground. Aluminum pistons will reduce the vibration, especially in four-cylinder engines.

Engine Misses at Low Speeds

Q.—I have a Studebaker, series 17, and it seems as though it misses on second speed. The ignition and carbureter seem to be in good order.

2—What can be done to get better mileage from this car? At present we are only getting 10 m.p.g.—Reader, Chicago.

You fail to state whether or not the engine misses in any of the other speeds. If you are sure the carbureter, ignition, etc., are in good shape, then, if the engine continues to miss, look for poor compression or a deranged valve mechanism. Fouled plugs cause missing; also a lean or over-rich mixture. Make sure the joints between carbureter and manifold are tight. Poor compression is caused by stuck piston rings or worn cylinders, also improperly seating valves.

2—You should be getting more than 10 m.p.g. An engine that uses an abnormal amount of gasoline is getting too rich a mixture; the valves may need grinding and adjustment, or the ignition and compression may be in bad shape. Adjustment of the carbureter will help to eliminate the rich mixture. Also in driving cut down the supply as much as possible and run with the air adjustment in the position where it gives the engine all the air possible. If you suspect the carbureter is in need of adjustment, have it examined for the fuel level. Also see that there are no leaks in the line. The connection at the bottom of the fuel tank often is overlooked and a leak may have developed here, with the result that gasoline constantly is being lost.

Driving with the spark lever retarded too far is wasteful of fuel. See also that the throttle stop screw is so adjusted that the engine does not run too fast idling or when the clutch is thrown out. A magneto with weak magnets gives a weak spark, and the result is that all the fuel is

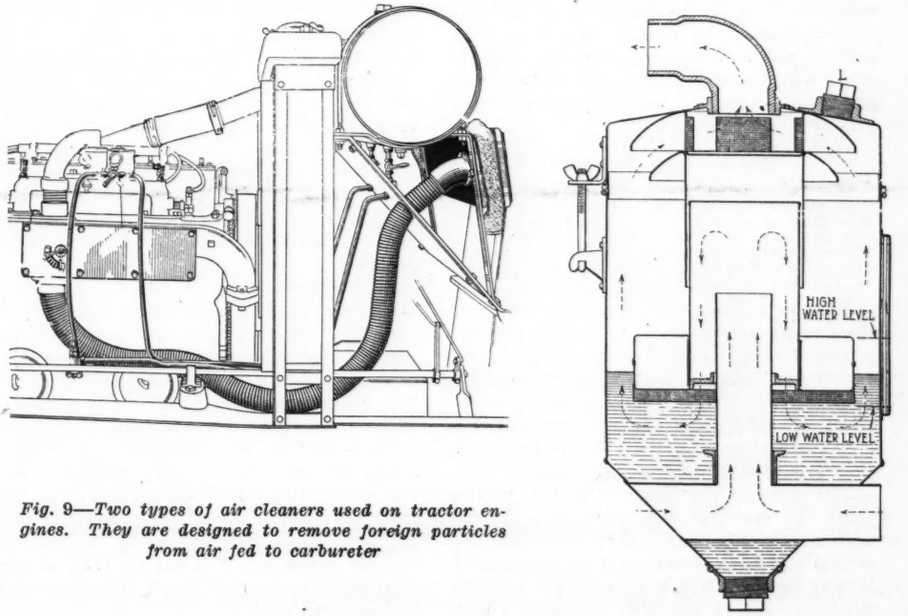


Fig. 9—Two types of air cleaners used on tractor engines. They are designed to remove foreign particles from air fed to carbureter

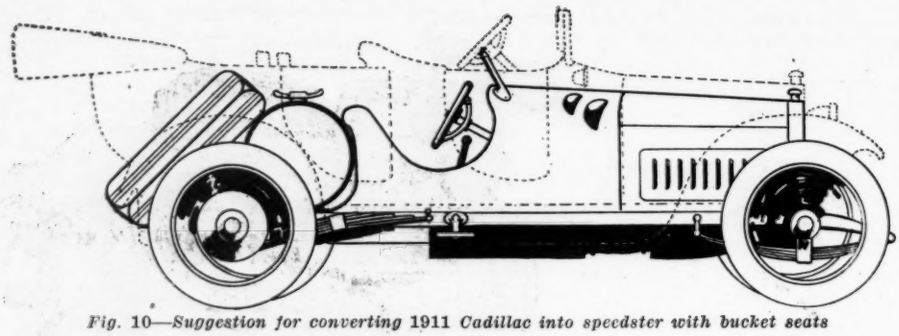


Fig. 10—Suggestion for converting 1911 Cadillac into speedster with bucket seats

not ignited properly, so that some of it is thrown out in the exhaust unburned. This is especially true when an engine misfires a great deal. The plugs should be kept clean and the points adjusted for the correct gap.

Obviously, if the valves do not seat properly, they must be reseated or ground in. The clearance is also important and for best results it should be as small as possible.

Removing Hudson Pistons

Q.—Explain how to remove pistons from a Hudson Super-Six 1917 model.—B. F. Sanders, Mamers, N. C.

There are two ways to do this. One is to remove carbureter, manifolds, etc., and slip off the whole block. This will expose the pistons so they can be removed, leaving the connecting rods intact. You will need someone to help you, as the block is quite heavy. It will be harder to replace, as the pistons must be guided into the bores. The second way is to take off the cylinder head, bottom half of crankcase, disconnect connecting rod caps and push pistons and rods through the block.

Measuring Cylinder Bore

Q.—What is the best way to tell how much a cylinder is out of round and what instrument do you use to tell this?

2—What does carbon consist of?—B. F. Stempsey, Youngstown, Ohio.

1—Micrometers are used for this purpose, although inside calipers will give approximately the amount the cylinder is out. The vernier-caliper is a very accurate instrument in its more expensive forms and measures to a thousandth part of an inch.

2—Carbon is an element and nearly all animal and vegetable substances contain it. Uncombined it occurs pure in two very different forms in nature, diamond and graphite, or plumbago.

Engine Gets Too Hot

Q.—I have a 1917 Ford with a Heinze starter. This engine gets very hot; it does not matter how fast or slow I drive. For instance, if I run 15 m.p.h. or 25 m.p.h it heats up the same. Water passages seem open, valves are ground and compression good. Why does it get hot?—W. L. Cline, Carlisle, Pa.

You do not state whether the water in the cooling system boils. Perhaps you are a new driver and because the engine gets pretty hot imagine that it is overheating. The internal combustion engine is essentially a heat engine and its best power is developed when the water in the jackets is just this side of the boiling point.

If the water continues to boil no matter what the speed is and there is a notable loss of power, then there is something wrong. If the radiator steams continually, it may be the oiling system is not working properly, due to too little oil or to a poor grade of oil. The very best oil you can get is the safest insurance against this, and the most economical in the end. Also examine the hose connections. Sometimes these look all right from the outside, but the inner layers may have separated and choked the openings. Sometimes people play tricks on a car owner and fit a blind gasket in the water connections, thus closing the openings.

Too much running on a retarded spark causes overheating also; therefore, make sure you drive with the spark advance as far as possible. Also examine the fan belt; it may be too loose.

Engine Has Peculiar Knock

Q.—I have an Overland, model 83 B, which has a peculiar tap at all speeds, similar to that of a pushrod. The car has been overhauled by a mechanic who claims that all bearings are all right, but the tap is still there. By short-circuiting the rear cylinder the tap stops. I then had a new wrist pin fitted in this cylinder, all valves adjusted, but this was no remedy for the trouble. What is your opinion?

2—I had non-leaking piston rings fitted in the upper grooves of my cylinders, but the oil seems to leak up through in the first two cylinders and these carbon up very quickly. My compression seems good. What is the trouble?

3—I cannot get as much speed out of my car as I could a year ago. The magneto has been recharged, valves ground, carbon scraped, carbureter adjusted and none of my brakes are dragging.—Budd Ritchie, Springhill, N. S.

1—If all the bearings, etc., are in good shape, such a knock may be caused by a worn piston and rings, producing what is commonly called a piston slap. Some authorities claim it is also possible to get such a knock from a spark plug, that is, one caused by the position in the cylinder. The plug in this cylinder may not screw down as far as the others, with the result that it fires in a sort of pocket. It is pointed out that the gas in the immediate vicinity of the points ignites first and then sets fire to the other. Of course, this happens almost instantaneously. Yet it is said sometimes to cause a peculiar tap, which ceases when the cylinder is cut out by shorting the spark. Such a knock is also possible with some of the patented rings, if the latter have not been installed properly.

2—Perhaps the rings you have are not the proper ones to prevent oil leakage. If an engine fitted with rings of the conventional type leaks oil past the pistons, this generally can be overcome by fitting one of the patented rings. But most of these makers furnish a special ring designed with a sort of oil container, which prevents the lubricant from getting up into the combustion chamber, and these are the ones that should be fitted in such a case. If your cylinders are out of round, obviously new rings will not prevent oil getting past the piston. Such cylinders must be reground first.

3—The fact that you do not get as much power as before may be due to the present heavy fuel. Your intake manifold is quite long for present-day tendencies and the result is that there is condensation of some of the fuel when it gets into the combustion chamber. This does not explode like the rest of the mixture, with the result that there is a falling off in power. This state of affairs also fouls the plugs and causes rapid carbon deposits.

Engine Dies on Hills

Q.—On a Velie 28 the engine after running 20 miles or more and getting warmed up will die when throwing out clutch coasting down a hill. Spark plugs are clean, carbon cleaned out, carbureter has been properly adjusted and will idle fine when car is standing. Car has been doing same since new. What is the trouble?

2—On an overhead six-cylinder engine where there are no petcocks is there any way of finding a missing cylinder without shortening spark plugs with screwdriver?—C. E. Hawdsley, St. Louis, Mo.

1—This might be caused by too rich or too lean a mixture. Also you may have your throttle so adjusted that it shuts off too far and starves the engine. The fact that the engine has done this since new leads us to believe that the throttle stop screw should be adjusted to give a slightly larger opening. If the carbureter is not set right for low speeds, it may stall the engine.

2—Feel of the spark plugs after the engine has run for a while and stopped. The plugs in the cylinders that have been missing will be much cooler than the others.

When to Fit Oversize Pistons

Q.—When are oversize pistons necessary in an old engine, that is, what would you use as a test for excessively worn pistons?—M. Torgerson, Wheaton, Minn.

Oversized pistons are necessary when the cylinders are worn out of round or worn so much that the clearance is excessive. Naturally to true up an oval cylinder bore would increase its diameter, hence larger pistons are necessary. A pair of inside calipers or vernier calipers can be used to determine the wear.

Valves and Hard Starting

Q.—Approximately how many thousand miles can the average engine be run before the valves need regrinding?

2—Supposing two four-cylinder engines identical with the exception that one has sixteen valves and the other eight. Would the sixteen-valve engine be more flexible and capable of slower speed?

3—On starting an engine with temperature 20 below zero, choker on and throttle about half open, the engine would fire about a dozen times, then quit. With choker partially or fully open and throttle anywhere from closed to wide open it would do the same. After about ½ hr. of this I noticed gasoline running out of the exhaust pipe. Was the reason that the engine would not continue to go after it had started because it was getting too rich a mixture? Would a weak spark have anything to do with it?—E. V. Ziedler, Palo Alto, Cal.

1—About 2000 miles represents the figure at which the average car can be driven before the valves need regrinding. This figure varies, naturally, with the type of valve mechanism, amount of oil fed, quality of mixture, adjustment, etc. Some valves need regrinding at the end of 1000 miles or even less.

2—Experience seems to show that an engine fitted with sixteen valves is more flexible than the eight-valve. This is not true of all engines, however, because much depends upon the design and construction.

Two intake valves per cylinder naturally allow more gas to be taken in, as the total valve area is made greater than where only one intake valve is fitted, even though the former are smaller in diameter. In the same way the exhaust valves allow the burnt charges to get out faster. It is in speeds over 25 m.p.h. that the sixteen-valve engine shows to best advantage. With the sixteen-valve arrangement where the valves are directly over the pistons the effect is to produce a more nearly spherical combustion chamber, which is the ideal sought by designers.

3—This trouble would be due mostly to the extremely low temperature. Gasoline is very hard to vaporize at low temperature, and consequently the raw gasoline runs back in the manifold and floods the carbureter, or some of it is sucked into the engine and owing to some of the cylinders misfiring is thrown out through the exhaust valves and into the exhaust pipe. After the engine gets hot and the manifold warms up, the engine continues to run, because the gasoline does not condense on the warm walls of the manifold.

Third Cylinder Fouls

Q.—I have some trouble with a model 25 Buick. The No. 3 cylinder fouls the spark plug so it will not work. I have changed spark plugs around, but it is always the third cylinder that gives the trouble. Have put new rings on and the cylinder is not scored, but the trouble continues. Seems to have a good spark when holding the wire away from the plug. Please advise.—A Peterson, Wallingford, Iowa.

If you are sure the cylinder bore and piston are in good shape, together with ignition, it may be the trouble is due to the valves, which are out of adjustment or in need of refacing or grinding. Although you state you have fitted new rings, we believe if you would fit one of the patented kinds designed to prevent oil leakage, much if not all of your trouble would be overcome.

Rebuilding

Five-Passenger Sporting Phaeton

Chicago, Editor MOTOR AGE—Distinctive open body designs are very rare except for the occasional high-priced jobs that are seen on the more expensive makes of cars. Although this feature is being developed more than ever before there is a common sameness to the majority of American passenger cars. The writer has endeavored to show by the accompanying illustration a genuine luxurious type of open body designed with new and really distinctive lines. As the so-called beveled top idea seems to be in vogue it has been modeled after these lines.

Note the long low chassis with its sturdy frame and large springs, hung so that the body always will remain horizontal with the road and yet not look overloaded. The wheelbase is 144 in. which, with the 34½ by 4 in. tires allows the use of a low yet comfortable body. This design has a feature that has not as yet been developed by many manufacturers. Note the body outline; how part of the hood is curved and does not start in a straight line from the large rounded radiator, which is the highest point in the body outline. Note the sturdy slanted windshields, how the beveled cowls are swept back from them and the rear shield has as secure an appearance as the front one. Also it has glass shutters, made in two collapsible parts, built to really serve their intended purpose.

Note the strong well-proportioned top with its strictly motor car lines, something more than a one-man-top creation. The after part of the body is swept over the chassis, real torpedo lines, which with the rounded hood and beveled sides of the body give it a yacht-like appearance.

Note the shape and position of the wide doors, the exposed handles of the rear ones, also the roomy compartment for the driver. The fenders are graceful, one-piece oval, with the rear ones swept over the wheels. Fenders play an important part in the appearance of a body design. Note the position of the sidelights, also that the louvres are placed on the top of the hood.

The body is of aluminum, with solid mahogany trimmings, is slightly wider at the top, permitting the use of heavy deep arm-chair upholstery, worked into rich tilted seat cushions and backs. As there is no aisle, the center windshield with its shutters folds into the back of the front seat, out of sight, and is protected by a wooden roll curtain which slides into the floor out of sight, when not in use. The color of the body is light buff with a dull finish, khaki top, deep maroon running gear and polished nickel trimmings. The radiator is of polished nickel. There are small lights on the front fenders, the spare tires are carried on the gasoline tank resting flat against the back of the body and there is a small compartment in back of the rear seat.

While this type of car is expensive to build and is not a stock proposition it cannot help but show that there are yet many luxurious ideas in open-body designs to be produced.—Julian F. Brasor.

Wants to Rebuild Dorris

Q.—Show drawing of 1910 Dorris touring car made into club roadster with top, slanting windshield and fenders, also apartment in rear, similar to the Mitchell club roadster and give approximate cost of such a body. I am a mechanic and expect to do part of the work myself, such as covering top and upholstery and making the running boards.

2—Could I make left-hand drive and center control out of this car and install generator and lighting system?

3—Would I get better results from a more up-to-date carbureter? The present one is slow in pick-up, being the 1910 Stromberg with which the car was originally equipped. Would it be better to shorten the manifold? It is very long. Or should I put a hot-air or waterjacket over it? The carbureter is hot-waterjacketed William Kopp, Santa Barbara Cal.

1—MOTOR AGE has no picture available of this car at the present time, but we suggest that you refer to some of the numerous designs which have appeared in this section for the last two years with a view to finding one that meets your requirements. Many of these designs, though intended for a particular make, can be adapted to other cars equally as well, inasmuch as we give only a general idea of the external appearance.

2—Changes of this kind require much work and it is not always possible. The only way to tell is to size up the job and see how much work is necessary and whether or not it will pay in the long run. Better consult a service station about the lighting and starting system. You car is an old timer and special brackets would have to be made for attaching the various units, all of which means time and money.

3—Better fit an entirely new carbureter of modern design. This you can get with complete hot-air fittings. Modern fuel is not handled properly by the older instruments.

Wants More Speed

Q.—I have a 1913 Buick, model 31, which I am going to make into a speedster. Give an idea of what I have to do to get more speed out of it. Would like to get again as much speed out of it if I can. Could I get more speed if I geared it up more? What would you gear it to?—M. G. Roth, Reading, Ohio.

Much depends upon the condition the car is in, as to how much it can be speeded up. If the engine is in good shape, you can try boring out the cylinders and fitting slightly larger pistons, either the lightweight cast-iron type or aluminum. Lighten the connecting rods by drilling holes in the web but not too close to the big end. Increase the compression by planing off some of the cylinder block bottoms. You might also try enlarging the opening of the valves in their cages. This means quite a bit of work. If you do this, it will be necessary to fit a larger carbureter. The ignition might be set ahead slightly and the intake valves timed to open a little earlier. You can change the rear axle gear ratio, but it is hard to tell just what this should be, as so much depends upon the engine performance and whether or not the car is to be used for road or track. All this kind of work requires a great deal of experiment and it is only by actual tests that an owner can tell if certain changes pay.

1911 Cadillac Into Speedster

Q.—How can I build a speedster out of my 1911 Cadillac with bucket seats and 25-gal. tank back of seats. Can you tell me who builds these bodies?—William J. Lechner, Muscatine, Iowa.

A suggestion for this is shown in Fig. 10. To reduce the over-all height of the car cantilever springs have been fitted in the rear. Naturally this would be somewhat costly, but it would make a very snappy design and easy riding car. Turn to the advertising section of MOTOR AGE, in which you will find concerns specializing in this kind of work.

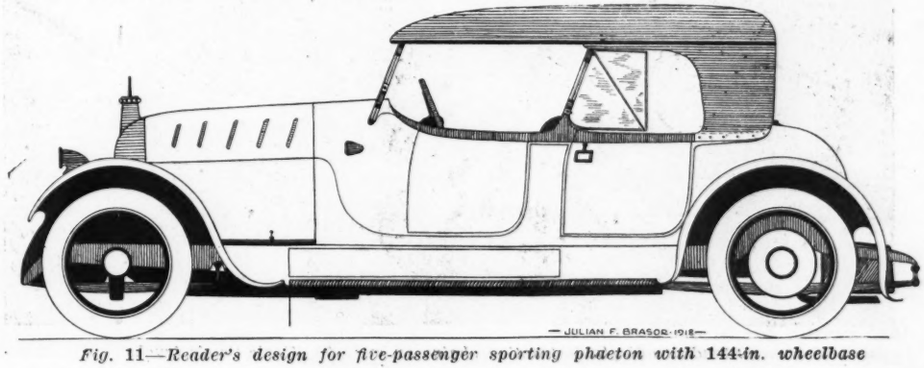


Fig. 11—Reader's design for five-passenger sporting phaeton with 144-in. wheelbase

The Accessory Corner

Utility Rim Wrench

THE improved Utility universal rim wrench is built in only one size but automatically fits every nut on every demountable rim. The wrench is finished in nickel and black enamel and is more compact and lighter now. It is built with practically unbreakable jaws and is shortened to go into the tool box without folding, at the same time being absolutely rigid in action. Price, $1.50.—Hill Pump Valve Co., Chicago.

National Ford Bodies

National bodies for Ford cars are offered in five-passenger and two-passenger models. The National body includes windshield, one-man top, fenders, skirts, runningboards and instrument board, hood and is complete with a new radiator 3 in. higher than the Ford radiator. The company is incorporated to build worm-drive trucks, delivery and passenger bodies for motor cars and is in operation in the old Marathon motor car plant. This product is designed to give the Ford all the grace and lines of more expensive cars. Price, $250. —National Body & Mfg. Co., Nashville, Tenn.

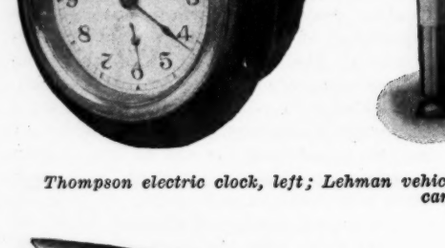
Double-Acting Valve Lifter

The Beardsley double-acting valve lifter holds the valve down, at the same time raising the spring by the operation of the cam lever. The engine can be spun while the lifter is in place and an adjustment on the valve stem obtained, it is said. The device is made of cold rolled steel and is strong and durable. Price, Ford lifter, $1.50; universal lifter, $3.—Loomis-Beardsley Mfg., Columbus, Ohio.

Wheel and Tire Carrier

The Draver wheel and tire carrier consists of a pair of convex disks between which the tire or wheel is clamped by a nut on the supporting spindle. Removal of the nut instantly releases the outer disk and the wheel. If demountable rims are carried the entire device, including the demountable tire, is carried on the central spindle. The central spindle, with the locking nut, serves to clamp and lock the parts securely. The tire can be incased in a cover, affording a weather-proof inclosure for the whole outfit. The convertible spindle permits two wheels to be carried on the same axis as one, the extra wheel being taken care of by an extension spindle. The initial equipment may be for carrying one wheel or one demountable rim only. Then if the owner wishes to carry two wheels or rims, extra parts can be obtained.—E. R. Draver Mfg. Co., Richmond, Ind.

Thompson electric clock, left; Lehman vehicle guide, center; and Draver wheel and tire carrier



Troy closed car windshield with all sections in closed position

Timer Elevating Attachment

The Thomas timer elevating attachment for Ford cars makes it possible to carry away the timer wires from grease, oil, water and dirt. The timer can be removed easily for cleaning, it is claimed, and the device is of high-grade material throughout. Price, $5.—Thomas-Andrews Corp., Waukegan, Ill.

Petcock Wrench

The Stay-On petcock wrench is a stationary device which eliminates the necessity of getting under the car to find out the condition of the oil supply. Installation requires prying apart the right-hand fender to insert the spring end of the wrench from the under side of the fenders, placing the socket end of the wrench over the upper oil petcock and squeezing together the bottom of the socket of the wrench. The spring at the other end of the wrench rests on the fender to prevent the wrench from rattling. In cars without the runningboard shield or with shields that do not rest against the fenders a small hole can be pierced in the fender and the spring attached by a small stove bolt. Attachment requires 2 min. only, it is said. Price, 35 cents.—Motor Car Equipment Co., 21 West Sixty-second street, New York.

Vehicle Direction Indicator

The Lehman vehicle direction indicator is an electrically- or gas-lighted flexible post containing a fire alarm bell. It is designed for placing at street intersections so that if accidentally driven into the car can pass over it, after which the post will rebound to normal position. The post is painted in bright colors, and the light has a red globe and can be lighted from the central station. The alarm bell can be started ringing when the fire apparatus leaves the station and rings continuously until the apparatus passes the post. The posts are built complete with wiring so that installation requires only a hole 6 in. in diameter and 18 in. deep with slush concrete in which to set it. Price, complete

Standley adjustable traction chains on one of Uncle Sam's trucks

with bell, $50; without bell, $42.50.— J. H. Lehman, Elkhart, Ind.

Closed Car Windshield

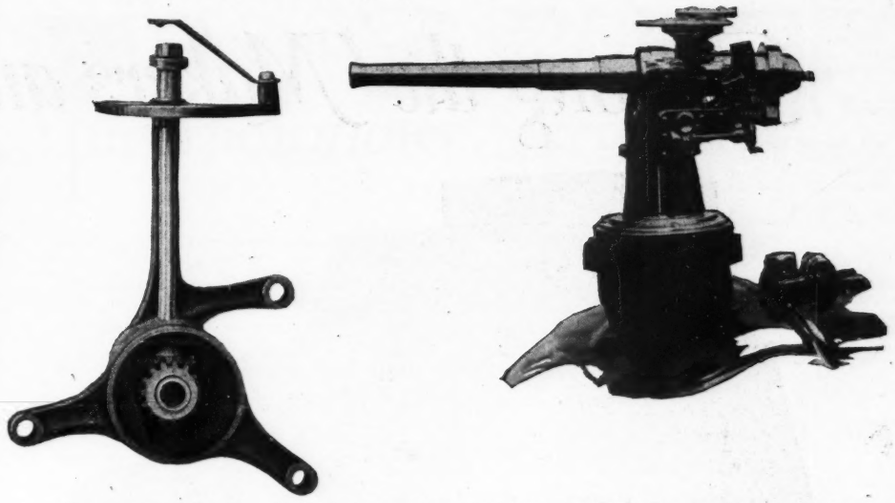
The Troy closed-car windshield is attached simply by screwing it in place. Lockers hold each section firmly in any desired position. All the lockers can be operated in the same length of time that it takes to operate one thumb screw, it is claimed. The windshield contains no thumb screws. Either section operates either inwardly or outwardly and locks at any angle. The device is weather- and water-tight. A rubber weather strip, which can be repaired or replaced, completely surrounds each sash, closing the device tightly. A storm section insures clear vision by protecting the top section from rain and snow.—Troy Carriage Sun Shade Co., Troy, Ohio.

Thompson Electric Clock

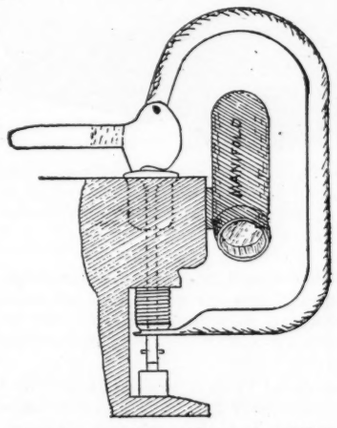
The Thompson clock operates on dry cells or storage batteries of any voltage. The clock winds automatically at specific intervals, consuming a small amount of current and preventing the battery from deteriorating from non-use. No wires enter the case of the clock, which is dust-and water-proof. The movement in the case, which is Seth-Thomas, is mounted on springs, overcoming vibration and rattle. Lights must be turned off before making connections for its installation. Connect a wire to the binding post on the back of the clock that has the fiber washer. This wire is to be connected to the line leading direct to battery. Connect another wire to the other binding post on the clock. This is the ground wire and is to be connected to any place where a contact can be found that will wind the clock. If the car has a metal dash and a grounded connection, only the one battery wire is used. Price, $12.—Thompson Electric Clock, Memphis, Tenn.

Standley Traction Chains

Standley adjustable traction chains are built specially for solid-tire trucks. They consist of individual cross chains which can be put on in a very short time and without jacking up the wheel. The chains are made of separate units of twist-link, anchors for attaching the inside of the cross chain to the wheel and adjustable steel rings concentric with the rim to hold the outside ends of the cross chains loosely. These anchors are placed permanently on the felloe with lag screws. The cross chains are put on separately across the tire and strung on the ring. When all the chains are thus in place, the ring is connected by a turnbuckle. The cross chains are carried loosely so they will have freedom of play and distribute the wear throughout the tire. Holding the cross chains on one side only makes them take a diagonal position, which reduces the side slip. Ninety per cent of the capacity of the company's plant is given exclusively to Government work. The chains were given extensive tests by the Quartemaster Department and have been placed on the approved list for Government service.—Standley Skid Chain Co., Boone, Iowa.



Thomas timer elevating attachment for Ford cars, left, and Liberty gun radiator emblem



Beardsley double-acting valve lifter

Gun Radiator Emblem

The Liberty gun radiator emblem is worked out in detail, with sighting apparatus, elevating and breach lock parts, which are reproductions of the large naval guns and is finished with a high nickel polish. The device was copied from naval guns now mounted on transatlantic liners for submarine protection, it is said. Price, $5.—Liberty Sales Co., 366 Fifth avenue, New York.

Utility universal rim wrench, left, and National body for Ford cars

EQUIPPING THE OWNER'S SHOP

(*Concluded from page 37*)

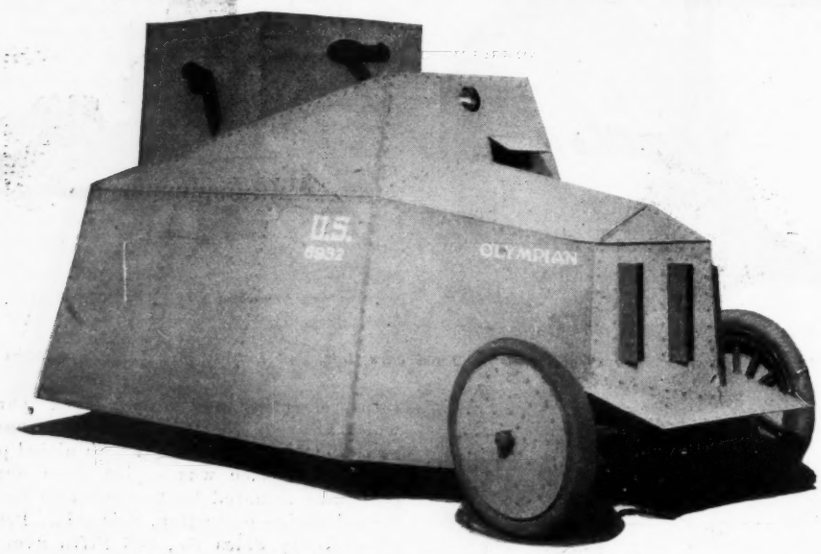
the planing mills with the top surface dressed. Saw them to the correct length, and put the one nearest the wall on top of the framework. Test it with a long, straight edge to which is clamped a level. It may be necessary to fit a thin shim of wood or cardboard under the plank at some point. Fasten the top to the two by four supports with ½ by 4-in. lag screws, drilling holes for them so the wood will not be split. Place washers under the heads of the screws. If there is an intermediate leg and supporting cross piece, the planks should be fastened to it also with lag screws, this time counterboring for the heads to sink them beneath the bench top.

Next fasten a 1-in. board on the front of the bench to act as an apron. This also stiffens the bench considerably. If desired this piece can be made about 12 in. wide, with openings cut into it for drawers, the guides for the latter being screwed to the under sides of the top planks.

The Vise

The vise perhaps is used the most in the shop and receives much handling. Therefore, be very careful to select a good one. See that the jaws close up evenly. A good machinist's vise with either stationary or swivel base should be selected, and although the latter is a little more expensive, the handiness of it offsets this. For all-around work the jaws should be about 3 or 3½ in. wide. This will take care of nearly all the work likely to be done in a private garage. There are many styles of vises, such as those fitted with a rapid action for quick opening and closing, necessitating only a slight twist to one side to lock it. All these are satisfactory, but for the owner's shop, where time is not always the important factor, the ordinary screw vise will do.

Among the Makers and Dealers



ARMORED CAR IN LIBERTY LOAN PARADE—This Olympian armored car, which took part in the Liberty Loan parade at Pontiac April 9, was designed by Douglas W. Petit of the Olympian company, who spent a year at the western front with the American Field Service

Rowe Motor Moves Plant—The Rowe Motor Mfg. Co. has moved its offices and plant to its new quarters at Lancaster, Pa., from East Downington, Pa.

Griffin with California Chevrolet—Jack Griffin has been appointed advertising manager of the Chevrolet Motor Co. of California, with headquarters in Oakland.

Hall to Manage Combination Rubber—Joseph P. Hall, formerly treasurer-director of the Combination Rubber Mfg. Co., Bloomfield, N. J., has been appointed general manager of the company.

Deem to Manage Lane Production—Wesley Deem, formerly production manager of the Columbia Motors Co., Detroit, has been appointed production manager of the Lane Motor Truck Co., Kalamazoo, Mich.

Scafe with Dayton-Wright—L. R. Scafe, secretary and treasurer of the Saxon Motor Car Corp. the first two and one-half years of the company's existence, has been appointed comptroller of the Dayton-Wright Aeroplane Co., Dayton, Ohio.

To Make Fillers for Tires—The American Tire Filler Co. has purchased a factory site at Kent, Wash., and will erect a building in which rubber and composition fillers for tires will be manufactured. R. S. Wicks is president of the organization, which is capitalized at $100,000.

Johnson with Square Turn Tractor—Charles Johnson, formerly sales manager of the Maltby Auto Specialties Co. and for many years special representative for the Lovell-McConnell Mfg. Co., has been appointed fiscal agent in Michigan and Ohio for the Square Turn Tractor Co., Chicago.

Dealers Celebrate Freedom of Tolls—The freeing of toll roads in York county was celebrated at the third annual banquet of the York County Automobile Dealers' Association. With the elimination of toll on the four important sections of road through their purchase by the state it was decided that a program of ways and means for the achievement of this object should be arranged by the dealers' association, with the co-operation of the York Motor Club. The improvement of traffic conditions in general within the city limits was discussed and addresses on the subject were delivered by the several city officials and dealers in attendance at the banquet.

Trubulpruf Tires in Washington—The Lambert Trubulpruf Tire Co., recently organized at Portland, Ore., has selected a factory site in Everett, Wash., on which a two-story concrete building will be erected for the manufacture of tires.

Washington Company to Make Tires—The Washington Tire & Rubber Co. has been incorporated at Spokane, Wash., and will start work on a factory for the manufacture of tires, tubes and tire accessories. The company's authorized capital is $1,500,000.

Vim Gains Control of Sandusky Forge—The Vim Motor Co., Sandusky, Ohio, has obtained control of the Sandusky Forge Co. The former concern has increased its capital stock from $60,000 to $400,000. The company has received a Government order for steel hubs for artillery wheels.

U. S. Tire Promotes Shugart—George S. Shugart, formerly western sales manager of the United States Tire Co., New York, has been promoted to be manager of branches of the company to succeed O. S. Tweedy, who resigned. Mr. Shugart also has been elected a director of the company.

Lane Makes Sales Appointments—The Lane Motor Truck Co., Kalamazoo, Mich., has appointed the following sales representatives: B. H. Vail, factory representative in Indiana, Ohio and Lower Michigan, with headquarters at the factory and at Indianapolis; O. H. Pearsall, Michigan and Wisconsin territory; L. H. Cossey, Western New York and Pennsylvania; E. P. Lane, Dakotas and Minnesota; Ralph B. Comins, New England.

New Tire Concern Is Organized—The Universal Tire & Rubber Association has been organized at Dallas, Tex. The officers are: S. Reele, chairman and organizer; O. A. Ryfle, director of sales; F. A. Doran, director of merchandising; Francis X. Schuler, tire construction expert. The organizers plan to establish at Dallas the largest tire manufacturing concern in the Southwest. It has not been incorporated. Tires with a guarantee of 4,000 miles are to be made.

Willys-Overland Counts War Men—Willys-Overland now has 4901 employees in the service of the United States. The service flag contains 4901 stars.

Gilmour with Racine Rubber—J. V. Gilmour, Chicago, has been appointed assistant advertising manager of the Racine Rubber Co., Racine, Wis., maker of tires and tubes.

Schlabach with Paige-Detroit—A. W. Schlabach, formerly in the publicity department of the Saxon Motor Car Corp., has been appointed assistant advertising manager of the Paige-Detroit Motor Car Co.

Saxon Has 2300 Unfilled Orders—The Saxon Motor Car Corp. has 2300 unfilled orders on file. Inability to fill these orders is due to the lack of sufficient material and parts to supply the demands for cars. Other companies with many orders on their books are suffering in like manner.

To Make Coupler Device—The Buller Coupler Co., Madison, Wis., has been formed by B. B. Clarke, James L. Clarke and Edward E. Parkinson to engage in the manufacture of the Buller coupler, an improved and patented device for connecting loads to tractors and other motive power.

O'Neil with Worthington Pump—Thomas O'Neil, formerly of the Hercules Gas Engine Co., Evansville, Ind., has been made assistant general manager of the Worthington Pump & Machinery Corp. gas engine works at Cudahy, Wis. Mr. O'Neil succeeds George W. Thexton, who has gone to the Bucyrus Co., South Milwaukee, as works manager.

Continental Motors Buys Land—The Continental Motors Corp. has added 34 acres of land to the Muskegon properties of the company. This brings the total to more than 50 acres. No plans have been announced for immediate extension, but it is likely that the Continental plant will be enlarged soon.

Lane Truck Increases Production—Preparations are being made at the Lane Motor Truck Co. to greatly increase the production of worm-drive trucks of 3-, 5- and 7-ton capacity. These trucks are fitted with electric lighting, high-tension magneto, electric starting, cabin curtains, windshield, bumper and regulation chassis equipment. W. W. Lang is vice-president and L. W. Hamilton is secretary-treasurer and general manager.

Used Car Business Less—The Detroit retail branch of the Studebaker Corp. did more than $50,000 worth of business during March. In the used car department 300 cars were on the floor during the winter; at the present time the supply has been decreased to only 150 cars. Owing to inability to get enough new cars to trade in the used car business has dropped slightly. Light used cars are in more demand than the heavier models.

Kugler and Glass Join Globe—Dr. Herbert W. Kugler and R. E. Glass have resigned from the Firestone Tire & Rubber Co., Akron, to become associated with the Globe Rubber Tire Mfg. Co., Trenton, N. J. Dr. Kugler was identified for nine years with the Firestone organization, originally chief chemist and later technical superintendent, in which capacity he had charge of the designing of both the product and manufacturing equipment and also assumed general direction of all materials and manufacturing processes. Mr. Glass served eleven years as treasurer

Recent Incorporations

Indianapolis, Ind.—Noble Motor Truck Co.; capital stock, $1,000,000; incorporators, C. J. Monton, A. M. Jacobs, John Hauff, G. M. Patterson, H. L. Postle, George D. McLeod and W. G. Roberts.

Kansas City, Mo.—Ellington Motor Co.; capital stock, $20,000; incorporators, William Ellington, C. Berry Clair and John F. Parker.

Lancaster, Ohio—L. E. Huddle Co.; capital stock, $50,000; incorporators, R. W. Mendhank, C. F. Vandyke, J. W. Huddle, George C. Welker and F. J. Wright.

Little Rock, Ark.—Arkansas Motor Truck Co.; capital stock, $10,000; incorporators, S. M. Bolton, H. C. Wilson and J. O. Evatt.

Lowell, Mich.—Overland-Lowell Co.; capital stock, $10,000; incorporators, John R. Keise, J. J. Tucker and Clinton E. Wood.

Marshall, Tex.—Wilson-Overland Motor Co.; capital stock, $15,000; incorporators, H. O. Wilson, C. M. Abney and F. J. Smith.

Milwaukee, Wis.—Lear-Diel-Droegkamp Co., Inc.; capital stock, $20,000; incorporators, Hubert J. Lear, Joseph O. Diel, Herbert A. Droegkamp and Anthony J. Roehl.

Milwaukee, Wis.—Auto Lamp & Radiator Co.; capital stock, $5,000; incorporators, Howard R. Haberla, M. A. Haberla and Harry R. McLogan.

Milwaukee, Wis.—Electric Welding & Mfg. Co.; capital stock, $10,000; incorporators, George F. Luehring, Oscar Greulichand and Joseph Stika.

Milwaukee, Wis.—Bursinger-Durkin Co.; capital stock, $5,000; incorporators, Frank Bursinger, D. W. Durkin and W. V. Thompson.

Milwaukee, Wis.—Utility Hoist & Mfg. Co.; capital stock, $25,000; incorporators, W. C. Woodin, A. G. Kritch and A. J. Jansen.

Norfolk, Neb.—Overland-Nebraska Co.; capital stock, $100,000; incorporators, R. W. Schutt, F. H. Clark and H. H. McCulla.

Oklahoma City, Okla.—Federal Truck Co.; capital stock, $20,000; incorporators, J. T. Newberry, E. B. Cockrell and A. O. Kemper.

Oklahoma City, Okla.—Globe Tire & Accessory Co.; capital stock, $50,000; incorporators, Hamlett Thompson, T. A. Gibson and R. J. Thompson.

Oklahoma City, Okla.—Liberty Garage Co.; capital stock, $10,000; incorporators, G. L. Walters, C. O. Fowler and F. B. Sims.

Oklahoma City, Okla.—Smith-Paris Motor Co.; capital stock, $25,000; incorporators, J. E. Wadley, James C. Smith and A. E. Reid.

Omaha, Neb.—Mid-City Motor & Supply Co.; capital stock, $40,000; incorporators, John W. Grodons, W. S. Johnson and W. T. Ross.

Omaha, Neb.—W. M. Clement Motors Co.; capital stock, $100,000; incorporators, W. M. Clement, R. S. Odell and James T. McGuckin.

Orwell, Ohio—Orwell Garage Co.; capital stock, $25,000; incorporators, B. C. Kingdom, H. R. Shipman, George L. Kingdom, W. W. Wolcott and J. P. Walcott.

Peoria, Ill.—Dickerson-Lehmann Motor Co.; capital stock, $25,000; incorporators, U. S. Dickerson, E. D. Lehmann and R. N. McCormick.

Peoria, Ill.—Cadillac Motor Sales Co.; capital stock, $20,000; incorporators, A. C. Salzenstein, W. A. Wood and C. V. O'Hara.

Phoenix, Ariz.—Bowzer Truck-Tor Co.; capital stock, $100,000; incorporators, L. Howard, R. M. Bowzer and G. S. Hancock.

Phoenix, Ariz.—Simpson Auto Wheel Co. of Chicago; capital stock, $200,000; incorporators, H. N. Kent, L. A. Kent, S. J. Kent, Henry J. Tofteness, Alex Simpson and John B. Keller.

Phoenix, Ariz.—United Auto Supply Co.; capital stock, $350,000; incorporators, M. L. Todt and H. L. Kiefner.

Phoenix, Ariz.—Peerless Ring Co.; capital stock, $20,000; incorporators, A. Jones, G. L. Jones, E. K. Dignowity and H. Dignowity.

Port Clinton, Ohio—Port Clinton Standard Garage Co.; capital stock, $10,000; incorporators, Frank Holt, Otto Stensen, Harry Stensen, Avolene Stensen and Mildred Clausen.

Portsmouth, Ohio—Portsmouth Auto Supply Co.; capital stock, $5,000; incorporators, J. F. Taylor, W. S. Hollenbach, D. E. Newman, Mrs. Romie E. Taylor and Simon Labond.

Quincy, Ill.—Morris Adler-Moller Co.; capital stock, $15,000; incorporators, H. B. Moller; J. H. Moller, M. O. Adler and K. H. Adler.

Richland Center, Wis.—Richland Center Motor Car Co.; capital stock, $15,000; incorporators, W. C. Schall, B. W. Reagles and N. V. Schall.

Rock Island, Ill.—Campbell & Wochner Co.; capital stock, $35,000; incorporators, S. A. Campbell, H. E. Wochner and C. H. Campbell.

Rockford, Ill.—Reliable Tire & Vulcanizing Co.; capital stock, $5,000; incorporators, E. G. Peterson, A. L. Peterson and E. M. Peterson.

and member of the executive board of the Michelin Tire Co. and has just completed seven years as general auditor and member of the executive board of the Firestone company.

United Motor Parts Corp. Formed—William Friedlander has organized the United Motor Parts Corp. as manufacturer and exporter of high-grade motor car accessories. Headquarters are at Chicago.

Brown to Manage Sanford Sales—F. C. Brown has been appointed sales and advertising manager for the Sanford Motor Truck Co., Syracuse, N. Y. Mr. Brown formerly was district sales manager of the Chase Motor Truck Co.

Shaw Organizes New Foundry—J. George Shaw, formerly president and treasurer of the Milwaukee Steel Foundry Co., has organized the Shaw Foundry Co., Milwaukee, Wis., which already is engaged in a large production of gray iron castings for the motor car and tractor trade.

Gold Star on St. Louis Row—Frank Wright, formerly a mechanic for the Hudson-Phillips Motor Car Co., St. Louis, Mo., died of pneumonia at Urbana, Ill., where he was in the United States aviation service. His is the first gold star on a motor car company service flag in St. Louis.

Service Truck to Increase Output—Contracts have been let by the Service Motor Truck Co., Wabash, Ind., for the construction of two new buildings, which will give the plant a capacity of twenty trucks a day. With further additions soon to be started the capacity will be more than doubled to allow for fifty trucks a day.

Manning to Manage Sales—John R. Manning has been appointed sales and advertising manager of the Coleman Tractor Corp., which is now actively entering the field of tractor production. The company is capitalized at $400,000 and is building a factory about 3 miles from the center of the business district in Kansas City, Mo.

Goodyear Makes Branch Changes—The Goodyear Tire & Rubber Co., Akron, Ohio, has made the following changes in branch managers: D. E. Randall, branch manager at Providence, R. I.; C. B. Peschman, formerly Boston branch manager, New England district assistant manager; W. E. Dermody, manager of Boston branch; W. C. Blake, formerly branch manager at Long Island City, assistant manager solid tire department at Akron, Ohio; A. W. Ellis, formerly assistant, branch manager at Long Island City; J. O. Humbert, branch manager at Dayton, Ohio; F. T. Hesse, branch manager at San Diego, Cal.; John Daheney, branch manager at Syracuse, N. Y.

Bridges to Build Car Plant—The Bridges Motor Car & Rubber Co., Fort Worth, Tex., has awarded the contract for several buildings of its new manufacturing plant. The site of the new factory comprises 289 acres of land on the outskirts of the city. Clarence W. Bridges is president and general manager.

Northwestern Business Expands—The Northwestern Chemical Co., Marietta, Ohio, maker of chemical specialties for motor cars, has grown so in business that for the fourth time in two years it is erecting more buildings to provide additional space. The capital stock also has been increased from $150,000 to $500,000.

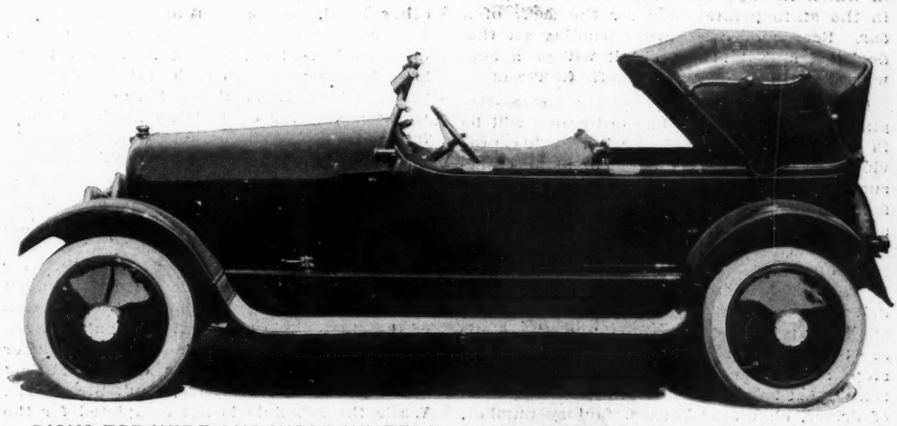
Mitchell in New Building—The Mitchell Motors Co., Racine, Wis., has completed its new building, which is 329 by 94½ ft. and contains some 117,000 sq. ft. of floor space. A feature of the structure is a complete sprinkler system with two wide stairways and steel fire doors to protect the workers.

Lansing-to-Ottawa Driveway—One of the features of the driveway made by E. K. Emerson and T. Roberts of two Oldsmobiles from the factory at Lansing, Mich., to Ottawa, Canada, was a non-stop run between Cleveland and Watertown, leaving Cleveland Friday at 2:30 p. m. and driving continually until Watertown was reached at 9 p. m. the following day.

Diamond T Again Enlarging—The Diamond T Motor Car Co., Chicago, already has found it necessary to enlarge its practically new plant. The present quarters, entered last June, cover floor space of 125,000 sq. ft. Work has been started on an addition to relieve congestion in the machine shop and production department. Approximately 7200 sq. ft. will be added.

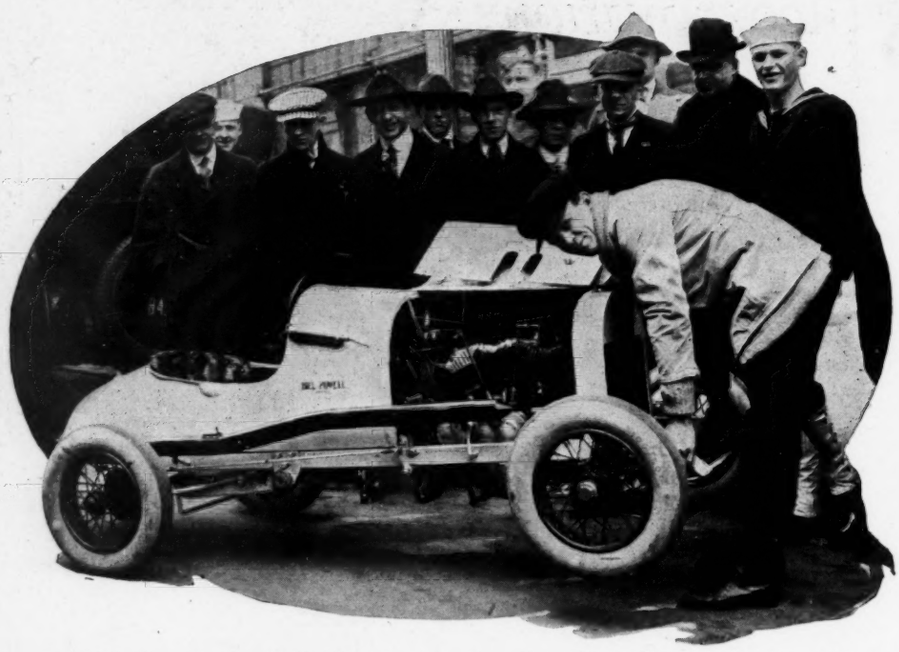
Menominee Truck to Double Capacity—The Menominee Motor Truck Co., Menominee, Mich., is comfortably settled and operating at full capacity in its new factory. The plant contains machine shop, smithy, body shop, paint and trimming shop, assembling floor, etc. The output of trucks, which during 1917 numbered approximately 500 vehicles, will be more than doubled.

E. O. Wood Is Dead—Edwin O. Wood, assistant to W. C. Durant, president of the General Motors Corp. and a director and treasurer of the Chevrolet Motor Co. of New York, died recently at Pasadena, Cal. Mr. Wood was a writer on the history of Michigan and the Northwest and is the author of "Historic Mackinac" and "History of Genesee County, Michigan."



DISKS FOR WIRE AND WOOD WHEELS—A Marmon 34 equipped with disks made by the Schutte Body Co., Lancaster, Pa. The company has patents pending on this type of disk, which is designed for wood and wire wheels

From the Four Winds



MOTOR CAR WITH MOTORCYCLE ENGINE—Car built by Bill Powell, 1730 West Erie street, Chicago. It is 11 hp., with Harley-Davidson motorcycle two-cylinder engine and three-speed sliding transmission. It is capable of 60 m.p.g., and weighs 400 lb. Tires are 20 by 4, or airplane tires. Mr. Powell built the wheels. The gas tanks are in the rear and the oil is in the radiator

To Teach Use of Tractors—Realizing the importance of the use of tractors the Texas Agricultural and Mechanical College has opened a class for instruction in the use of tractors. Tractor engines are to be bought for the institution and the students will be given instruction in the various lines of work.

Marion, Ohio, Distributes Maps—Ten thousand road maps with descriptions of the city of Marion and various points of interest are to be distributed by the Marion, Ohio, County Automobile Club. This is part of a campaign being conducted in co-operation with the Marion chamber of commerce to bring tourist travel through Marion.

Texas Law Held Valid—The Texas court of criminal appeals recently sustained and held to be legal the Texas car theft law making it a felony to steal or even tamper with a motor car. The case was in the affirmation of a case in which the appellant was given two years in the state penitentiary for the theft of a car. Scores of cases were pending on this decision, and it is thought it will go a long ways toward reducing car thefts in Texas.

Minneapolis to Have New Bus Laws—Beginning May 6 a new bus ordinance will be in effect at Minneapolis, Minn. This provides for $10,000 surety bond, or an inter-insurance contract. The license is $25 up to seven passengers and $2 additional for each additional seat. Not more than 50 per cent above seating capacity shall be carried and none on runningboards. Applicants must be resident at least ninety days and must have drivers at least twenty-one years old. Fares shall be paid only at stops and the stops are to be at the same corners that streetcars stop, and those stops only. The proposed route must be named in the application, name of driver, chauffeur license, factory number, type and power of car and factory number. Fare is 5 cents between 5 a. m. and midnight and not more than 10 cents otherwise. Full routes must be run by each car. Drunken or disorderly persons are barred and not more than one person will be allowed on seat with driver.

Trucking Companies for Southwest—One of the southwest's first truck companies is operating between Dallas, Tex., and Tyler, a distance of 100 miles. Fifteen big trucks are in operation. A regular schedule between the towns is observed and to date not a trip has been missed. The company is the Dallas Freight Truck Co. It has been incorporated for $50,000, and this soon is to be added to and at least thirty trucks placed in operation on the line. Similar companies are being formed in different parts of the state.

Break Up Car Thievery—Through the work of the Dallas detective department it is thought a band of car thieves operating between Texas and Oklahoma has been broken up. Recently a dozen cars stolen in Dallas have been recovered in Oklahoma. On the other hand, cars stolen in Oklahoma have been recovered in Texas. Three arrests have been made and since then fewer car thefts have been reported in both states. The plan under which it is thought the men were working was for cars stolen in Texas to be taken to Oklahoma, where they would be worked over slightly and then sold.

East Michigan Pike Tour July 7—The date for the start of the third annual East Michigan Pike tour has been advanced one day. The getaway will be made on July 7. Another day also will be added to the time for the tour. It being necessary to carry on most of the propaganda in the northern section of the state, little time will be spent between Detroit and Bay City. The stops made after Bay City will be: Tawas City and East Tawas, Alpena, St. Ignace, Sault Ste. Marie. While the schedule is not completed for the return trip, it is likely that one night will be spent in Cheboygan. The tourists will move on south then, making a stop at some point between Cheboygan and Saginaw, planning to make the latter town on the following night. The distance of the tour is approximately 750 miles and the tourists will be called upon to average 83 miles per day.

Another Truck Freight Line—A motor truck freight line to handle freight and express between Buffalo and New York is being organized as the Empire State Motor Transport Lines, Inc. The new concern was scheduled to begin handling freight between Buffalo and Rochester April 15 and between those two cities and New York June 1.

Tractors Demonstrate in Delaware—A tractor demonstration was held near Dover, Del., recently, at which all sections of the state were represented. Seven tractors were in action at a time, plowing and doing such work as tractors are capable of doing on a farm. There were many inquiries. The exhibition was under the auspices of the Kent County Farm Bureau and was open to all who cared to exhibit.

Enforce Texas Blue Laws—Scores of counties in Texas are enforcing what is known as the Blue laws and are prohibiting the sale of gasoline and oils on Sunday. In several counties as the result, and especially in the larger towns of the state where such sales are prohibited, fire rates have increased. It is claimed the law is responsible for many persons buying large tanks in which to store gasoline for Sunday consumption and that such has increased the fire risks.

New Road from Toledo to Saginaw—A project to establish a direct highway between Toledo and Saginaw has been launched. The pike will be on the line between Genesee and Shiawassee counties, held under the auspices of the Michigan State Good Roads Association, and will go by way of Durand, Ann Arbor and Ypsilanti to Toledo, saving 25 miles for motorists over the present routes via Detroit. At Saginaw it will connect with the Top of Michigan highway to Mackinaw. The pike from Toledo to Mackinaw will be 333 miles.

May Ask Government Road Aid—Government motor trucks are doing so much damage to the roads leading from Washington to New York, which pass through Wilmington and Philadelphia, that the authorities may ask for Government assistance in rebuilding the roads and keeping them in shape. Such a move already has been started in Maryland, the matter having been brought to the attention of members of Congress from that state, while Delaware, which is taking preliminary steps toward building the road in the state that is used for this purpose, has not yet taken the matter up with the Government. The state began the rebuilding last summer, but as material was tied up the work has been greatly delayed.

New Brunswick to Keep on Right—The legislature of New Brunswick has decided to conform to the rules of the road now in operation in Quebec and other Canadian provinces and the United States. When the highways act recommended by the committee of the whole house goes into effect the drivers of all vehicles in New Brunswick will keep to the right instead of to the left. The three Maritime provinces and British Columbia have been the only provinces to retain the old English custom of turning to the left. It had been hoped that simultaneous action would have been taken by the legislatures of Nova Scotia and New Brunswick on this subject, but action had been deferred in Nova Scotia.